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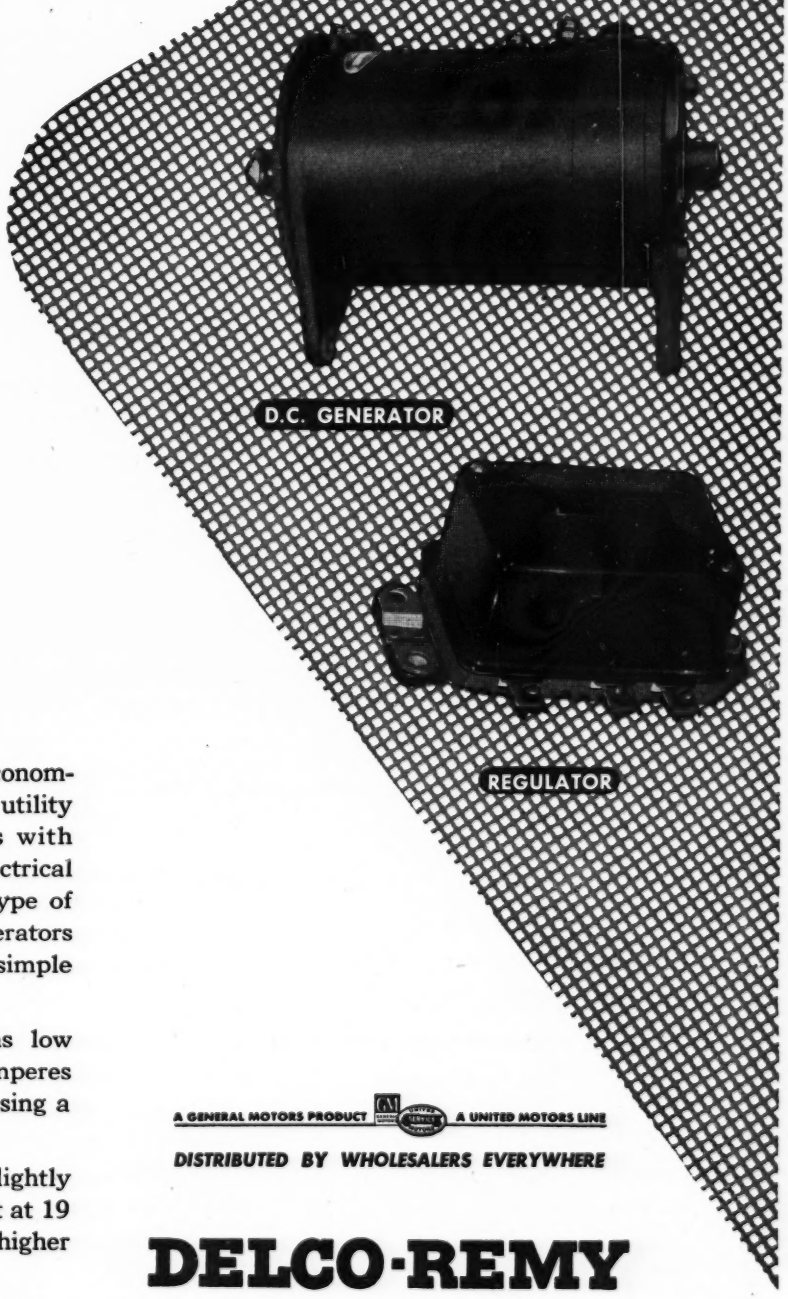

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GAS

29th Year of Publication

JULY 1953 · VOLUME XXIX · NUMBER 7

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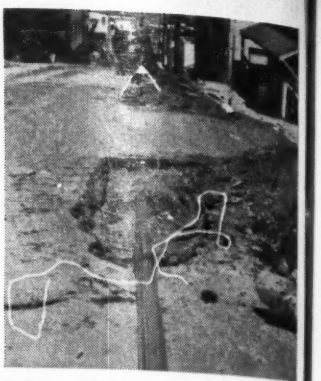

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Thermally Thinking

SPOT NEWS AND COMMENT ON GAS INDUSTRY AFFAIRS

Highlighting the News

No more Atlantic City shows?

The board of directors decided at GAMA's recent annual meeting that the association would not sponsor the traditional exhibition in Atlantic City, "or at any other location, in connection with the 1954 convention of AGA." The decision was "final"—almost. The door was left open for a reconsideration at its meeting in St. Louis in October. Lyle Harvey, treasurer, has been designated to poll the members between now and then. GAMA and AGA officials intimate there's plenty of time left to decide. Whether AGA would follow suit and move its convention elsewhere is a matter of conjecture only.

Tax issue goes to highest court

The controversial gas gathering tax imposed by Texas is now ready for a Supreme Court test of its legality. The Texas high court recently upheld its validity, but Panhandle Eastern and Michigan-Wisconsin pipeline companies are contesting the decision.

Algonquin seeks court order

Recessed hearings on the matter of serving natural gas to New England will be resumed July 9, FPC has decided. Meanwhile, Algonquin went to court once more last month—this time in an effort to obtain a court order permitting completion of the line through Westchester county, N. Y. Said property owners who are bitterly opposing the petition: "The application is in reality a move to regain possession of the lands and be in a postion to present to FPC a fully completed line before the hearings on the plaintiff's right to do so are brought to a close."

Restoration's the law

Massachusetts has passed a new bill requiring that natural gas pipeline companies restore property to its original condition after pipelines have been laid.

Range shipments fade slightly

May shipments of gas ranges totaled 191,700, 41,000 less than April's total but still 17.8% ahead of 1952, reports GAMA. Every month this year has outstripped the corresponding 1952 month, and the five-month total of 987,400 is 14.5% better than that of last year. Gas ranges pulled a bit farther ahead of electric ranges in April, last month for which electric range figures are available. The ratio was 1.7 to 1, a considerably more comfortable margin than the 1.4 to 1 record of the first quarter.

The big spenders

Utilities are once again near the head of the parade in spending money for plants and equipment, says the Department of Commerce. They are expecting the largest increases in capital outlays over last year of any industry, with $3.3 billion ticketed for the first three quarters of the year, one-fifth more than in the same period in 1952. First-quarter expenditures hit $904 million; for the second quarter, they were an estimated $1216 million, and a third quarter record of $1205 million predicted.

That's that!

Secretary of the Interior Douglas McKay's decision not to appeal the court verdict nullifying the restrictions placed by his predecessor on common carrier gas pipelines puts an end to the matter (see Pipeline News section). Unlike the famous Phillips case, in which other parties could take up the cudgels for bigger government, Mr. McKay had the sole choice of appealing the case or not appealing it. Most trained Washington observers believe that if he had appealed the case, judging from previous decisions, the Supreme Court, as constituted, would have sustained the Interior Department's contentions. But since he did not appeal, legal opinion is that the decision of the lower court will "harden" into an accepted legal court interpretation of Interior's licensing authority under the Mineral Leasing Act.

An Eye on the Capital

No quick relief for Phillips

Reversal by the U. S. Circuit Court of Appeals for the District of Columbia of the so-called Phillips case (see page 62) puts the whole controversy of whether the Federal Power Commission has jurisdiction over independent gas producers squarely in the Supreme Court's lap. Among legal observers (and even among Congressmen), the consensus here is that the Supreme Court will agree with the circuit court of appeals. Legal observers long have felt that FPC's effort to make such legislation as the Kerr bill unnecessary might not square with what the Supreme Court has ruled in many other notable decisions. The FPC decision was made very difficult by the sweeping authority delegated to the FPC by the U. S. Supreme Court in both the Colorado Interstate (1945) and the Interstate Natural Gas (1947) cases.

By a two-to-one decision, the circuit

Thermally Thinking

court of appeals ruled that it had no choice except to force jurisdiction on the FPC to regulate sales of gas producers and gatherers, whether independent or pipeline affiliation or otherwise.

Since Sen. Robert E. Kerr (D.-Okla.) and others always have contended that it was never the intent of Congress to place the independent gas producers, such as Phillips Petroleum Co., under FPC's regulatory control, it would seem that Senator Kerr and other Congressmen from gas-producing states would rush to revive legislation such as the old Kerr bill, vetoed in 1950 by Harry Truman. President Eisenhower likely would sign such a bill.

However, quick Congressional action is not in the cards, for many reasons, mostly political. The Republicans, faced with a campaign issue that they are the "give-away" party, already are feeling the whiplash of consumer ire. They are not going to push legislation that would make it seem they want to ream the consumer still more.

At the same time, finding himself the leading proponent of the smear-the-Republicans on the "give-away" issue, Senator Kerr would be somewhat embarrassed if he now brought out his old bill.

The Kerr bill actually was introduced in the early part of this session by Rep. John E. Lyle Jr. (D.-Texas), and rests in the House Committee on Interstate and Foreign Commerce. It likely will continue to rest there, for the outlook definitely is for Congress to wait until the Supreme Court rules before taking any action. This might put the case above politics until after the 1954 campaign is safely out of the way, since it is unlikely to be ruled upon quickly by the Supreme Court.

"Liberal" columnists—Lowell Mellet, Thomas E. Stokes, Marquis Childs, *et al*—have had a field day poking fun at the FPC for shirking what they say has been its obvious responsibility to regulate natural gas from the ground up. Their ridicule—coupled with the Democratic campaign in the Congress to label the Republicans as a "give-away" party—likely has spiked successfully any action in Congress, if any action were contemplated.

Rates, still

Rates continue to be a No. 1 problem for federal gas regulators (the FPC). Some efforts are being bent toward simplifying and streamlining procedures (along the line of recommendations of certain state bodies, as outlined in June *GAS*, pp. 47-48), most cases still have to wade hip-deep through a morass of governmental red tape and backlogging.

One case that might have been settled on a lower stratum (on the basis of Claude Draper's minority opinion) and thus cut through some red tape was the investigation of rates charged by United Gas Pipe Line Co., Shreveport, for gas delivered to a wholesale customer, Willmut Gas & Oil Co., Hattiesburg, Miss. The problem: equalization of rates between wholesale customers at the same location.

In the FPC order deciding the case, United was told to reduce its 25-cent rate to 17½ cents, the prevailing charge for gas United delivers to Mississippi Valley Gas Co. at a point close by.

To United's challenge of its jurisdiction (*intrastate* gas is being delivered to Willmut), FPC replied that originally deliveries were made through a certificated interstate pipeline, and that certain "severances and removals" which United had made subsequently were for the avowed purpose of restricting deliveries to local gas; and since these alterations were unauthorized, commission jurisdiction was unaffected.

But Commissioner Draper disagreed on the jurisdictional matter, remarking that "the apparent theory that violation of Sec. 7(b) by United converts nonjurisdictional matters to jurisdictional ones is one I can't follow."

The new concept of settling certain disputed rate proposals between pipeline companies and distributors (*GAS*, June, pp. 47-48) also came up for examination several times in June. In one instance, an offer of a compromise settlement by several utility customers of Transcontinental Gas Pipe Line Corp. was rejected. The customers, including utilities in New York, New Jersey, and Pennsylvania, proposed to give Transco $6 million instead of the $9.8 million it was seeking, on a pro rata basis. FPC dismissed the motion, saying that under its rules, full opportunity exists for the parties to hold conferences for the purpose of formulating a settlement, without the direction of the commission.

Compromises

However, another settlement offer was approved—the $5,129,000 increase in the wholesale rates of Mississippi River Fuel Corp., proposed and agreed to by the parties and the FPC staff. Mississippi was asking $6.5 million. In return for acceptance by FPC, Mississippi agreed to abandon and dismiss two law suits then pending concerning orders issued by FPC May 29 and Aug. 4, 1952, respectively, rejecting and denying earlier rate increase proposals.

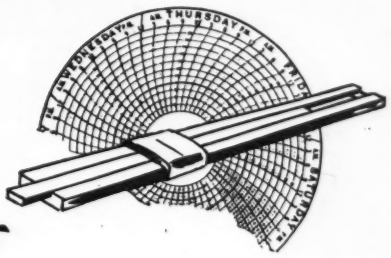
Said FPC in commenting on its decision:

"The decision will result in substantial savings of time and money to the commission, Mississippi, its utility customers, and other interested persons, which might have been expended incident to extended, formal hearings and rate proceedings, apart from the rate matters in litigation between Mississippi and the commission. The proposed settlement, including the lower rates, reflects a reasonable basis for settlement in the public interest, under the Natural Gas Act."

A much smaller, but also significant, settlement was arrived at in a case involving Lake Shore Pipe Line Co., Ashtabula, Ohio. In this instance, FPC permitted Lake Shore to withdraw a proposed $182,162 (28.1%) wholesale rate boost, under FPC suspension since February, in consideration of commission approval of a lesser ($102,599) increment, to become effective retroactive to May 20. The revised rates had been submitted May 11 for the express purpose of settling all issues involved in the suspension proceedings and with the understanding that if they were permitted to become effective, no further proposal for an increase would be filed for at least 60 days; and that any refunds that might be paid by Lake

Continued on page 77

Technical Trends



• By GUY CORFIELD

*Flame temperature**

Questions are often asked as to the temperatures of flames. Such temperature, of course, depends on the analysis of the fuel, whether it is being burned with air or oxygen, the temperature and pressure of the fuel-air or oxygen mixture and the ratio of the volume of air or oxygen supplied to that just necessary for chemical combination to complete combustion of the fuel.

The U. S. Bureau of Mines recently issued its Report of Investigations 4938, "The Thermodynamics of Combustion Gases: Temperatures of Methane-Air and Propane-Air Flames at Atmospheric Pressure," dated January 1953, which tabulates the theoretical values for various inlet temperatures of the fuel-air stream, and various ratios of air to that required for complete combustion at constant atmospheric pressure. The tabulation indicates that methane, with the exact amount of air for combustion, starting at 77° F, will develop a flame temperature of 3549° F; the corresponding flame temperature for propane-air is 3621° F.

This bulletin can be obtained without charge from the U. S. Bureau of Mines, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.

"Color" thermometers

A convenient means of observing the approximate temperature of an object or surface, or determining visually when the temperature reaches a given level, is to coat it with a substance that will undergo a sharp and definite color change at a specific temperature. Such "thermocolors" are particularly useful for examining or observing areas of heat transfer surface, insulating coatings, etc., under conditions where it would not be necessary or even practical to explore spot temperatures with a pyrometer. Temperature-indicating paints have been developed both in Germany and the United States. The Bryson Oil Co. of Harriman, Tenn. is the U. S. distributor of the German line. In general, they are obtainable as powders which are mixed with alcohol to thin paint consistency. A range from 104° to 1832° F is covered by 28 different powders, which indicate by their color change to an accuracy of 9° F. The chemistry of the color change involves various reactions such as oxidation, and partial decomposition.

A somewhat similar means of temperature indication is afforded by a well known line of sticks, pellets and liquids marketed by the Tempil Corp. of New York City (11 W. 25th St.). Their materials have a sharp melting point at specified temperatures and cover the range from 113° to 2500° F with an accuracy of 1% of the degrees F at which they are rated.

Weed killers

One of the problems in a plant yard or along a pipeline right-of-way is to keep down weeds which not only present an unsightly appearance but can develop into a fire hazard when the growth is heavy and dry. To cut down weeds as they grow is, of course, laborious and repetitive, and so weed-killing chemicals are resorted to, but such chemicals should be carefully chosen to obtain the best results.

Such chemicals generally fall into three classes: contact killers, selective killers, and ground sterilizers. The contact killers are for the most part aromatic hydrocarbon solutions which destory the vegetation down to the soil surface but do not kill the roots; they therefore must be applied seasonally and repeatedly. The selective group, such as "2-4D," will kill ribbed leaf plants but not grasses (including most types of grains) and, therefore, while extensively used in agriculture for "weeding" grain fields and pasture land, do not meet the requirements of yard or right-of-way clearance.

The soil sterilizer group, capable of killing and preventing all growth for extensive periods, is the most useful for plant yard and pipeline weed control (except, of course, where the pipeline route is under crop cultivation for periods of the year). Many chemicals will accomplish this purpose to some degree but have certain disadvantages. For instance, arsenical compounds will be poisonous to humans and grazing or wild animals; common salt (sodium chloride) is corrosive to steel and should not be used where it can endanger surface or sub-surface piping; chlorates, when first applied to vegetation, will make it highly inflammable when dry; and all compounds that are highly water soluble will be dissipated by rainfall.

One of the most widely used soil sterilizing chemicals is crude borax which fulfills many of the requirements. It is cheap, non-toxic to animal life, non-corrosive to steel and only moderately soluble in water. It can be sprayed as a solution or scattered in granular form—if the latter, preferably during the rainy season so that penetration into the soil will result. The effectiveness will depend on the local conditions of soil, rainfall, etc., but reports indicate that, in an area receiving less than 25 in. of rain per year, an application of 10 to 15 lbs per 100 sq ft will have an effective life of about two years.

*Readers may have been—indeed, should have been—confused by the appearance of the first paragraph of this item in last month's issue. To them, our most humble apologies; we trust this admission of error will bring to an end their protracted state of puzzlement.

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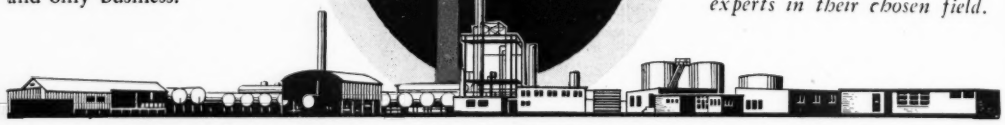

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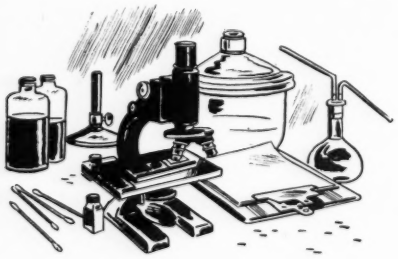

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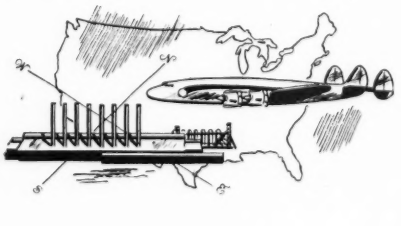

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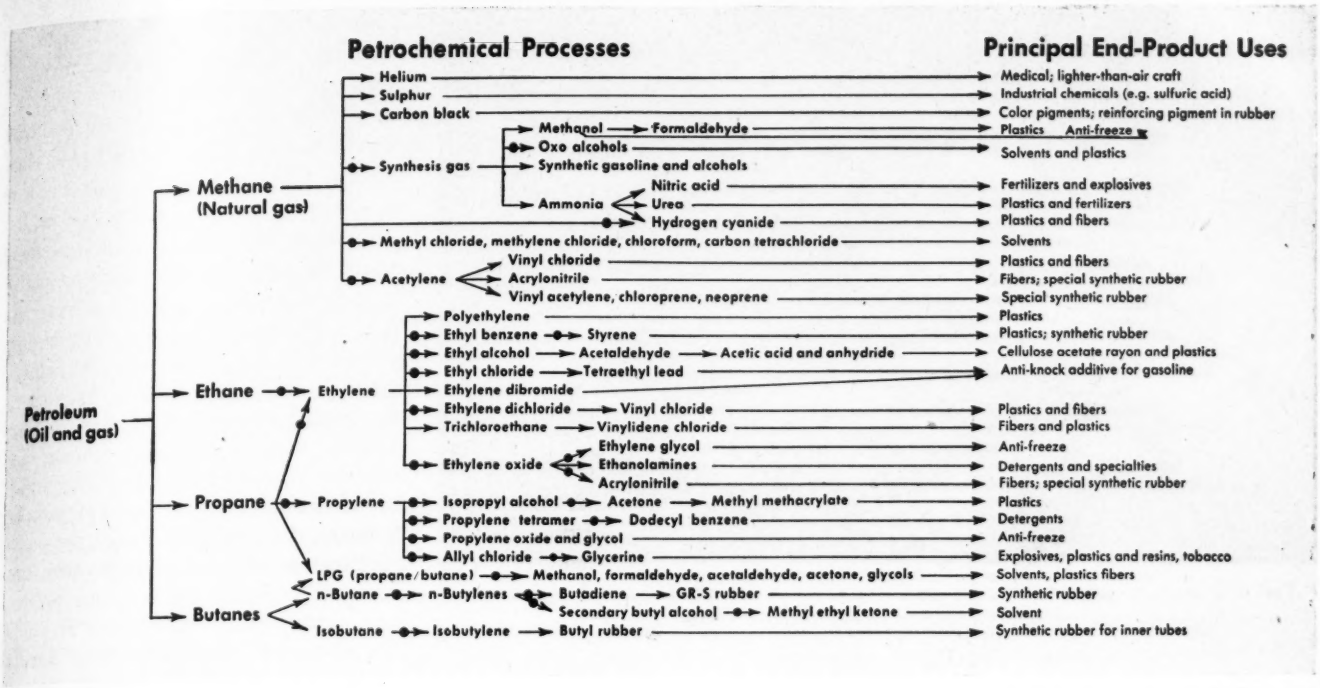


GAS exclusive

Petrochemicals from natural gas: Is this growing market a threat to the distributor?

By **GORDON KIDDOO** • National Research Corp., Cambridge, Mass.

The size of the chemical industry

THAT the chemical industry is one of the most rapidly growing segments of the American economy is a fact accepted by amateur and professional investors, by the oil and gas industry which supplies the raw materials for an important segment of the industry, and by those actively engaged in chemical manufacture. The chemical industry serves all of the 72 basic industrial groups recognized by the U. S. Chamber of Commerce and it is estimated that it accounts for more than 20% of all industrial production in the United States.

The petrochemical segment of the chemical industry is the most rapidly growing part and many believe that it is probably the largest part in terms of dollar sales. In each of the last three 5-year periods, investment in petrochemical facilities in the United States has doubled. This rate of growth is continuing and the petrochemical industry is expected by many to continue to double in size each five years for another decade. Capital investment in facilities for the production of petrochemicals now exceeds $2 billion. Annual U. S. production of organic chemicals is approaching 20 billion lbs and petrochemicals are believed to constitute more than 50% of the entire organic output of the United States.

Implications examined

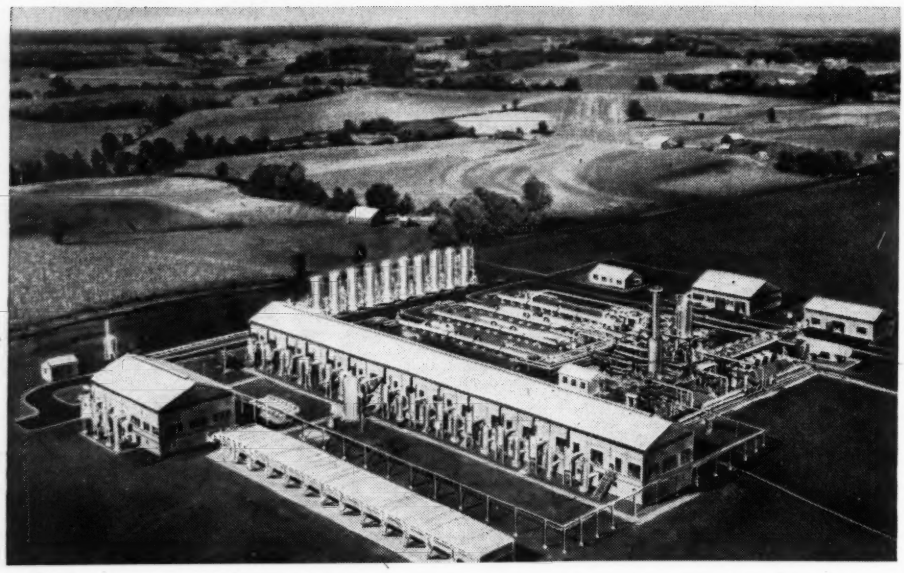
In view of this recent expansion in the petrochemical industry, and because this rate of growth shows no sign of slackening, it is of interest to examine the implications of this continuing growth on the markets for natural gas and for hydrocarbons extracted from natural gas.

Organic chemicals can be divided into two broad groups—aliphatic (or straight-chain) chemicals and aromatic (or cyclic) compounds. Before the development and growth of the petrochemical industry, the aliphatic chemicals were produced by extraction or distillation from natural sources, by fermentation of agricultural products, or by synthesis from coal. The weight of aliphatic chemicals produced is now larger than is that of aromatic chemicals; of all aliphatic chemicals, it is estimated that perhaps three-fourths are now derived from natural gas hydrocarbons.

The cyclic compounds, both saturated and unsaturated compounds, have been largely derived from coal heretofore; this is still the case to a great extent. The extraction and manufacture of benzene, toluene, and xylene from petroleum sources is growing in importance, however, although such sources as yet yield only a small part of the total production of cyclic compounds (only 14% of the country's benzene in 1952, for example).

Definition

Although the term petrochemicals is commonly used by such diverse groups as security analysts and operating men in the petroleum and chemical industries, there is no universal agreement on the meaning of the terms; each man in each group believes he has a satisfactory definition which, however, he can seldom express and even less commonly can write



The first plant to extract L. P. gas and ethane from Tennessee Gas Transmission's transcontinental pipeline is the one now in operation at Gabe, Ky.

down. Generally, however, petrochemicals are considered to be those industrial chemicals derived principally from natural gas or petroleum hydrocarbons. They are ordinarily basic intermediates, not consumed or used by the public, and are commonly sold to other chemical manufacturers or converted at point of manufacture to products which can be sold or readily converted to consumer products. The industry is generally made up of large, well-financed companies opating huge, integrated manufacturing facilities. In most cases, operations on a large scale are required for the economic production of chemicals from hydrocarbons. For this reason the technology of the industry has been highly developed in an effort to lower operating and capital expenditures.

Organic chemicals

Although petrochemicals are ordinarily considered to include only organic chemicals (containing principally carbon, hydrogen, and oxygen), there are certain important chemicals which are inorganic but are nevertheless derived from petroleum. For example, helium, carbon black, and sulfur are all obtained commercially by extraction or manufacture from natural gas or other petroleum hydrocarbons. Also, 80% of all the ammonia and ammonia derivatives in the United States are now made from natural gas; this process involves the conversion of natural gas hydrocarbons to synthesis gas, which is then further converted to ammonia by a well-known high-pressure synthesis developed in Germany more than 30 years ago.

Although many chemical intermediates are derived from petroleum sources and are petrochemicals, many of the chemicals derived from these intermediates and used for the manufacture of consumer goods are not ordinarily considered petrochemicals. This is principally because the technologies used for the conversion of the intermediates to chemicals for end-products are not original with the petrochemical industry and were, in most cases, developed for the conversion of intermediates produced from nonpetrochemical sources. For example, although a small but appreciable portion of our benzene is now manufactured from petroleum sources, manufacture of benzene derivatives is not ordinarily considered to be a part of the petrochemical industry.

Similarly, many polymers, plastics, resins, and synthetic fibers are derived, in large part, from intermediates manufactured from petroleum but are not true petrochemicals. Thus, although vinyl chloride, ethylene, styrene, and butadiene are derived from petroleum sources, the technologies for polymerization of these chemicals were not developed on petroleum intermediates and the polymerization operations are not ordinarily considered to be a part of the petrochemical industry. Although, as stated previously, the manufacture of certain aromatic compounds, such as benzene, toluene, and xylene (from which phthalic anhydride and terephthalic acid are made), is a part of the petrochemical industry, the petrochemical production of these chemicals does not represent their major production. Aliphatic chemicals are, however, manufactured principally from natural gas hydrocarbons and it is with the production of such chemicals derived from natural gas hydrocarbons that this report is principally concerned.

Products

Inasmuch as the processes used for the manufacture of aliphatic petrochemicals have been described recently and in considerable detail[1], the process descriptions will not be repeated here.

Fig. 1 does, however, show the most important petrochemical products manufactured from each of the important natural gas hydrocarbons and indicates the principal routes to the end-products for which the petrochemical intermediates are used. More than half of the production of almost every product shown is now derived from natural gas hydrocarbons in the United States. Within the next few years the exceptions, such as

1"Petrochemical Processes," G. Kiddoo, *Chemical Engineering*, September 1952.

TABLE 1 — ESTIMATED PETROLEUM AND NATURAL GAS REQUIREMENTS FOR PETROCHEMICALS INDUSTRY IN U. S.

	1950	1955	1965	1975
Primary products (million lb)	9,900	20,240	37,470	54,180
Hydrocarbons going into product, including losses (million lb)	6,900	15,040	27,080	38,780
Percent of total petroleum and natural gas requirements	0.68%	1.1%	1.6%	2.0%
Hydrocarbon going into product and liquid degraded into fuel gas (million lb)	7,400	18,920	36,280	53,230
Percent of total petroleum and natural gas requirements	0.73%	1.4%	2.1%	2.7%
Hydrocarbon raw material and fuel requirements (million lb)	19,100	41,540	74,580	108,780
Percent of total petroleum and natural gas requirements	1.9%	3.1%	4.4%	5.5%

TABLE 2. RAW MATERIALS REQUIRED FOR PETROCHEMICAL END-USES.
(millions of pounds per year)

	1955	1965	1975
Hydrocarbon raw materials to products and losses:			
For synthetic fibers	1,560	2,010	2,540
For synthetic rubber	1,980	2,590	3,130
For plastics	3,410	10,440	17,540
For surface coatings	1,150	1,830	2,530
For automotive chemicals	1,300	1,670	1,930
For nitrogen products	1,430	2,830	4.040
For detergents	580	860	1,020
Miscellaneous*	3,630	4,850	6,050
Hydrocarbon liquids degraded to fuel gas	3,880	9,200	14,450
Total hydrocarbon raw materials	18,920	36,280	53,230

(*—Includes insecticides, herbicides, dyes, miscellaneous solvents, etc.)

acetylene and its derivatives, will probably be derived principally from natural gas sources also.

Predicted demand for raw materials

A good source of data on future demands for petrochemical raw material is the report to the President which was submitted last year by the Materials Policy Commission. This commission, often called the Paley Commission after its chairman, examined the long-range raw material requirements of the United States, for both defense and civilian purposes; as a part of this study it examined in some detail the long-range requirements of the petrochemical industry for pertoleum and natural gas hydrocarbons.

The commission's findings on the hydrocarbon requirements of the petrochemical industry from 1950 to 1975 are summarized in *Table 1.* It can be seen that the commission estimated that the requirements for hydrocarbons going into products will increase approximately six-fold in this 25-year period; this increase will mean, however, that the percentage of the petroleum and natural gas requirements used for petrochemical products will increase only from 0.7% to 2.0% of the total petroleum and natural gas requirements. Correspondingly, the commission estimated that total hydrocarbon raw material and fuel requirements for the petrochemical industry will increase just slightly more than five-fold. This increase will represent a percentage increase in the total hydrocarbons required by the petrochemical industry from 1.9 to 5.5% of the total pertoleum and natural gas requirements.

The commission's estimates for end-uses of petrochemicals are presented in *Table 2.* It is estimated that raw materials required for plastics derived from the petrochemical industry will represent approximately one-third of the hydrocarbons required in 1975. Inasmuch as most of the petroleum hydrocarbons required for plastics manufacture are aromatic (or cyclic) compounds rather than olefinic or aliphatic materials and are generally derived from crude oil, not natural gas, the impact of the growth of the petrochemical industry upon the natural gas industry will be somewhat less than indicated by the figures for plastics in *Table 2.* In addition, because the demand for gas is increasing faster than is the demand for oil and because gas will probably supply a larger fraction of the country's energy in 1975 than it does now, the demand for gas for petrochemical manufacture will be a smaller fraction of the total demand for gas than is indicated by the figures for oil and gas combined which are presented in these tables.

Availability and price of raw materials

Although the requirements for hydrocarbons for gas-derived petrochemicals are expected to be less than 5% of the total demand for gas in 1975, it is important to examine the technical and economic factors which may influence the future availability of such hydrocarbons for chemical manufacture. Because the bulk of the natural gas will, in all probability, continue to be used for fuel (principally domestic and commercial fuel), the market price for dry gas will continue to be dominated by its fuel value.

Important charges for the transportation of natural gas from the producing areas in the Southwest to consuming areas in the far West, the North, and the Northeast are a direct function of the fixed investment in pipelines and compressor stations. In order to minimize the effect of this fixed investment, it is necessary to operate these facilities at full load the year round. Because the demand for heating fuel is highly seasonal, however, this is seldom possible and the relatively high cost of delivered gas in the northern and eastern areas of the country reflects the difficulty in maintaining high load factors on transcontinental pipelines.

Stabilized consumption

Several factors are now operating to stabilize the consumption of natural gas at the northern and eastern termini of transcontinental pipelines. One means, which has long been used, of levelling out the seasonal consumption of gas is the use of interruptible contracts for large industrial users. An even more important factor in stabilizing the seasonal utilization of the transcontinental pipelines may be the development of large, underground storage reservoirs in the North and East.

Chemical customers of gas pipeline companies have relatively steady demands; for this reason such customers have generally been considered desirable, as their requirements do not soar in winter months as do those of domestic and commercial customers. Because domestic and commercial consumers pay higher rates than do industrial users or chemical manufacturers (who also often have interruptible gas contracts), however, and for political reasons, the domestic consumer will receive priority if gas supplies are short. Thus chemical companies are never first on the list when gas is in short supply. In addition, as the use of underground reservoirs for storage of off-peak

TABLE 3. RAW MATERIALS AS PERCENTAGE OF MANUFACTURING COSTS AND SALES PRICES.

Product	Raw Material	Process	Raw Material Cost as a percentage of Mfg. Cost	Raw Material Cost as a percentage of Sales Price
Ethylene	Ethane	Cracking	37	25
Ethylene oxide	Ethylene	Oxidation	51	25
Ethylene oxide	Ethane	Cracking & Oxidation	19	7
Ethyl alcohol	Ethylene	Hydration	65	40
Ethyl alcohol	Ethane	Cracking & Oxidation	24	15
Ammonia	Natural gas	Reforming & Synthesis	20	13
Acetylene	Natural gas	Oxidative Cracking	22	11

gas near the domestic consumer as well as other means to obtain high pipeline load factors becomes more general, the attractiveness of the steady demand for gas by chemical manufacturers will become relatively less important.

It should be realized, of course, that this reasoning is valid only for chemical manufacturers near the end of pipelines and has much less weight when applied to chemical companies in the Southwest, which is where most of the petrochemical industry is, after all, located. Another important use of natural gas, in the fields by the oil and gas producing companies for the production and transportation of oil and gas to markets, obviously takes precedence over chemical plants, wherever they may be located.

Methane

Although the natural gas reserves of the country, expressed in terms of years of consumption, are continuing to increase, the rate of increase is slowing down and the availability of large blocks of uncommitted reserves is definitely limited. This leads to competitive bidding among pipeline companies for reserves and long-term gas supplies and obviously tends to raise the price of gas in the field. As the chemical consumption of natural gas is, and will continue to be, a relatively small part of the total consumption, the market for gas will continue to be dominated by its fuel uses. Manufacturers of chemicals from dry natural gas will face continually increasing gas prices in the next few years, principally because of the continuing demand for natural gas as a domestic fuel in the North, the East, the West, and perhaps the Northwest.

There is, obviously, a time in the future—probably many years in the future—when synthetic natural gas derived from coal will be economical when produced from such materials as Pennsylvania and West Virginia coals for use in the northeastern section of the country. Long-range, this suggests that companies now dependent upon low-cost natural gas as a raw material should investigate synthetic methane or synthesis gas derived from coal as an alternative raw material for aliphatic chemicals which are now derived from natural gas.

Ethane

It is only recently that ethane has become an important raw material for petrochemical manufacture, except as it previously occurred as constituent of refinery gases used for this purpose. As gasoline and cycling plants have been designed for increasingly higher propane recoveries, and as the installation of deethanizer and similar processing equipment has become more common in these plants, ethane and ethane-rich gases have become available as raw materials for chemical manufacture. They are now being used extensively in the Southwest; at least one major chemical company is constructing a multi-million dollar petrochemical plant which will use for raw materials a number of ethane-rich streams, purchased from a number of light hydrocarbon processing plants within a radius of about 100 miles of the plant and carried to the plant by pipelines.

Extraction plants

A significant trend in the natural gas transportation industry and in the petrochemical industry is the construction of LPG and ethane extraction plants on transcontinental pipelines at locations in the northern and eastern portions of the country. The first of these plants, owned by Tennessee Gas Transmission at Gabe, Ky., is now operating and is extracting essentially all of the LPG and heavier hydrocarbons and approximately 20% of the ethane from Tennessee's transcontinental pipeline. This operation provides an exceptionally attractive means for establishing a petrochemical operation, as the LPG, in effect, receives a free (or at least a low-cost) ride from the Southwest to northern marketing areas where it can command much higher prices.

Upon graduation from Cornell University, Mr. Kiddoo went into the natural gas production and processing department of the Chicago Corp. Following that, he spent several years in synthetic fuel research and development, with Hydrocarbon Research Inc. and the Texas Co., and as technical director for Continental Carbon Co. At present, he is director of the development department of National Research, in charge of business and economic studies and appraisals of new processes, fields, and products, sales development activities, and all marketing research.

Hydrocarbons

The entire mixture stripped from the pipeline gas is sent by pipeline to Mathieson Chemical Co.'s organic chemical plant, near the Ohio river at Doe Run, where the hydrocarbons are fractionated to provide marketable LPG products and an ethane feed for chemical operations. By-product sales of LPG and heavier hydrocarbons provide sufficient revenue for the plant so that the ethane is a very low-cost raw material for chemical manufacture.

A similar plant is under construction near Tuscola, Ill., by National Petro-Chemical Corp., a joint venture of National Distillers Products Corp. and Panhandle Eastern Pipe Line Co. Another possibility for an operation of this sort is that of the joint venture recently announced by Mathieson Chemical and Mississippi River Fuel Co., presumably for a plant near St. Louis.

Operation has limitations

Although these specific cases are attractive and undoubtedly profitable operations, the industry as a whole cannot adopt such schemes for several reasons. One reason is that extraction plants operating on the dry pipeline gas must be large to be economic. They must process a large volume of gas to recover enough LPG and ethane to pay for the extraction costs; the number of such pipelines which carry adequate gas volumes is definitely limited. Secondly, pipeline gases previously processed by new and efficient gasoline and cycling plants, in which the percentage of propane recovery is high, will be relatively dry and the cost of extracting the natural gasoline, LPG, and ethane will be relatively high. Finally, the extraction plant should preferably be located in an area where the LPG products can be sold for premium prices, i.e., in the northern and eastern parts of the country.

Some ethane and ethane-rich streams are also available from refineries and natural gas processing plants, but the num-

ber of gasoline and cycling plants of sufficient size to warrant segregation of the ethane and ethane-rich streams is limited and such plants cannot be counted upon for a large part of the ethane for petrochemical operation. For these reasons it is seen that although a certain, and perhaps an increasing, portion of the raw materials for petrochemicals will be ethane extracted from dry pipeline gas, it is unlikely that it will soon become the largest portion of the total feed for petrochemical operations based on natural gas.

LPG

The third group of hydrocarbons commonly used for gas-based petrochemical operations are those of the LPG fractions, principally propane, and normal- and isobutane. The marketed production of LPG has increased almost 10-fold during the past 10 years; during the last four years it has doubled and now totals over 4 billion gals. per year.

In 1943 less than 10% of the marketed production of LPG was used for chemical manufacture. By the end of the war (1946), this percentage had increased to over 20% but it has since remained at about that figure as the total marketed production of LPG has increased. It is not believed that the consumption of LPG for chemical manufacture will increase faster than will the consumption for all other purposes. The production and consumption of all LPG is, however, increasing at a rate greater than the rate at which natural gas consumption is growing. This is principally because the newer gasoline plants have been designed for an increasingly greater recovery of propane and butanes and older plants have been modified for higher recoveries.

Propane recovery

At the present time the average propane recovery from gasoline and cycling plants is only 40%; as much pipeline gas is not processed at all, probably only 25% of the propane present in natural gas is recovered as liquid. A further increase in the design figure for propane recovery in new plants from 40 to 60 or 80% will require substantial increases in plant investment. The point of diminishing returns has, in fact, probably already been reached for additional propane recovery with propane priced at its present level of about 4 cents per gallon.

Natural gas production will, however, continue to increase at a healthy rate, although it may be less than that of the immediate post-war years because of the increasing scarcity of undedicated reserves. Similarly, LPG production will increase at a rate at least as great as that of the rate of increase of natural gas production; in spite of the fact that it can be demonstrated (on paper) that we have reached the point of diminishing returns on higher propane and LPG recoveries, the trend towards higher recoveries, even at present high price levels, is likely to continue to be a factor in the growth of LPG production.

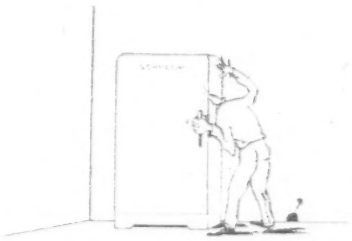
Although chemical markets for LPG have been attractive because they are not seasonal, as is the domestic and commercial use of LPG for space heating, other factors have entered the picture which will tend to stabilize the long-term price of LPG. One of these is the gradually increasing use of LPG as a motor fuel for trucks, city buses, and farm tractors. Such uses are not seasonal and in time will tend to raise the average annual price of LPG. Development of techniques and procedures for storing LPG in underground reservoirs during the off-peak summer season, although they are not yet entirely proven, will also tend to level out the seasonal consumption pattern for LPG.

For these reasons it is probable that the average price of LPG will gradually rise because of the higher costs of percentage recoveries in processing plants and because of the less seasonal fluctuation in the markets for these products. Furthermore, it is not believed that the domestic and commercial markets for LPG for space heating will be greatly affected by moderate increases in costs. In fact, it is unlikely that the fraction of LPG production used for petrochemicals will increase rapidly.

Summary

As it is probable that the long-term trend of natural gas (methane), ethane, and LPG prices is upward, it is important to appraise the effects which this price increase will have upon the utilization of these materials for chemical manufacture. *Table 3* shows the raw material cost as percentage of manufacturing cost and sales price for some of the more important organic chemicals which are derived from natural gas hydrocarbons.

In almost all cases the natural gas raw materials represent less than 25% of the manufacturing cost. Thus, for chemical operations in which raw materials constitute 20% of the manufacturing cost, a 50% rise in the cost of the raw material is required to effect a 10% increase in the manufacturing cost. In almost all cases the alternative non-hydrocarbon routes to these chemicals are not competitive even when increases in the costs of manufacture from hydrocarbons exceed 10%. For this reason, although the prices for light hydrocarbon used for petrochemical manufacture will gradually increase, this trend will not slow the growth of the petrochemical industry greatly. At the same time, however, it should be realized that the chemical uses of the light hydrocarbons will not represent a major portion of their total use.



What would you do?

- *Customer purchased new light bulb for his gas refrigerator and requests that a serviceman stop by to remove the old bulb and put in the new one.*

2 companies would do this free of charge.

2 companies would do this if a serviceman were on the premises for other work.

1 company would not render this service because it does not come within the scope of adjusting appliances.

1 company would refer the customer to a dealer.

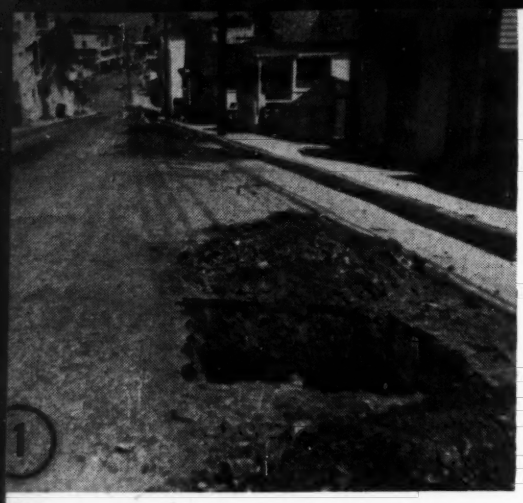
1 company would comply on a charge basis.

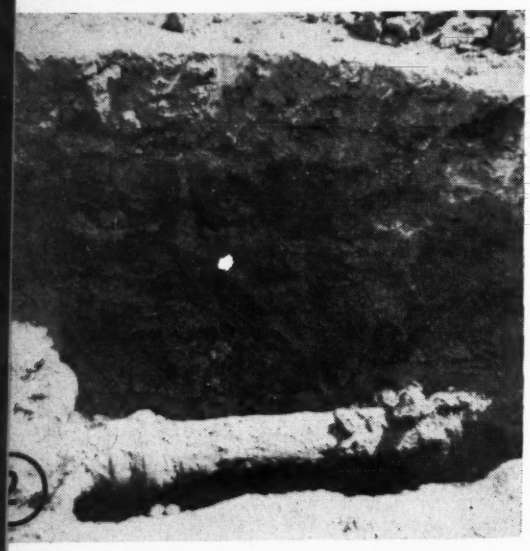
1 company would dispatch order for the second working day.

1 company would comply at the convenience of the company when a serviceman was in the neighborhood.

1 company would instruct the customer by telephone.

The service policy rule book doesn't always give the answer to whether, when, or how unusual service requests should be handled by utilities. The 10 companies who provide their own answers here are PCGA member utilities; the problem was one of 35 posed by H. E. Benninghoven, San Diego Gas & Electric, in a survey reported at the PCGA customer service conference, Fresno, Calif., March 18.





GAS exclusive

Nation's first plastic mains laid at Catalina Island

Small municipal utility replaces entire disintegrating network by insertion method

THE installation of a plastic pipe gas system in the city of Avalon, Catalina Island, Calif., is unique for a number of reasons. Not the least of these is the fact that 3-in. plastic pipe was inserted in the existing 4-in. cast iron bell-and-spigot type mains.

Avalon was faced with a serious problem. Its gas system was worn out and leaky. As time passed the condition became increasingly bad. An aggravating factor was the extremely acid soil, which reacted on the iron mains and steel service lines.

The leakage rate or unaccounted-for gas was high—20%. This was a major reason for wanting to replace the system. The 550-Btu propane air gas is distributed in the city's mains at approximately 6-oz. pressure to 1500 services. Controlled amounts of odorant are injected. Thus leaking gas could be readily detected throughout the city.

The installation chosen first was Metropole avenue, shown in Fig. 1. Approximately 600 ft in length, the street is on a 20% grade. Because of this it was thought that there would be little difficulty in inserting the new plastic pipe in the old main at the top and pushing it down in 60-ft lengths, with additional 60-ft lengths added until the full 600 ft were inserted. But many unforeseen obstacles arose before completion.

To start with, the inside diameter of the existing mains (4-in. and 6-in. cast iron) had been reduced as much as 50% due to tubercular growth, rust, and other foreign accumulations. *Fig. 2 shows a typical main.*

Steel service lines from mains to meters, shown in Fig. 3, were so badly corroded that they were useless for service. They were temporarily patched with friction tape until they could be replaced with plastic pipe.

During the installation, Metropole avenue was closed off. The line was exposed at service connections, which involved 12 manholes. But before the job

was completed there were 36 holes!

A serious difficulty showed up at once. The direction of insertion worked against the cast iron bell joints. The front end of the plastic pipe, which was plugged and pulled with a plumber's tape, would hit and hang up on projections at such points. At each such snag, street crews ripped up the black top, broke the cast iron pipe, and let the plastic pipe move on. *Fig. 4 illustrates this solution to the problem.*

Then again, at various points large accumulations of dust and rust piled up, jamming the plastic pipe tight. *Water was used to flush this out and that solved the difficulty as Fig. 4 indicates. A rotary pipeline clean-out device was used (Fig. 5) to remove as much of the inside accretion as possible.*

It was also discovered that the outside coupling used for normal installations enlarged the OD of the plastic pipe so much that it interfered considerably with the movement (Fig. 6). So a special inside coupling was fabricated, which solved the problem as illustrated in Fig. 7.

Special connectors

After the 3-in. plastic pipe was tied in at the end of the street, as shown in Fig. 8, the services were connected by means of special plastic saddle connectors, as shown in Fig. 9. These were cemented to the main over the opening provided for the gas outlet facing the direction of the service. The mating surfaces of the saddle connectors and the pipe were coated with solvent cement. They were secured with a special clamp for about five minutes, which was long enough to make a permanent bond.

Next step was to connect all necessary plastic fittings, such as nipples, ells, and couplings. *The plastic services were inserted in the existing steel services, usually a half size smaller (Fig. 10). A Telsco adapter was used for the end connecting to the meter riser, as seen in Figs. 11 and 12.* This incorporates a metal stiffener to the inside of plastic pipe (see cut) which, with a neoprene sealing ring and a clutch ring compression nut make a gas-tight joint.

On the second Avalon job, which was Marilla avenue, installation was completed between breakfast and dinner in a single day. Gas servicemen checked and re-lit all pilot lights on appliances after completion to prevent fires or explosions.

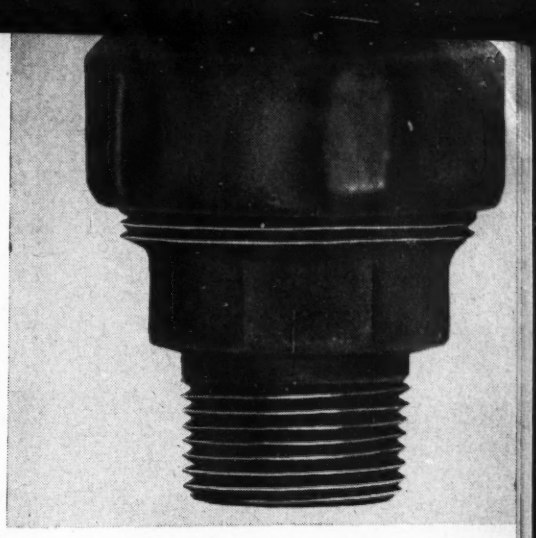
Friction prevented

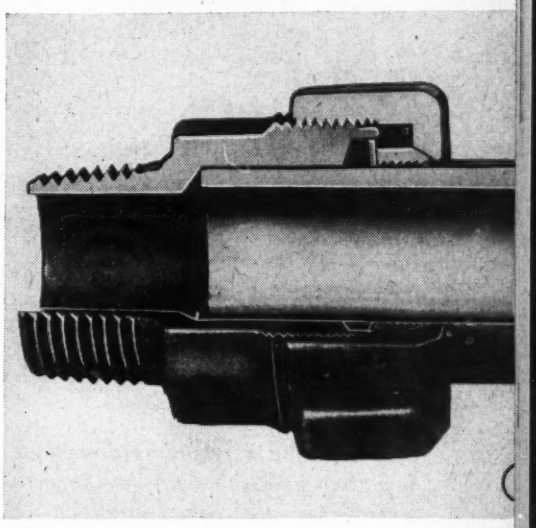
In both cases, when the streets were backfilled the plastic pipe was carefully surrounded with at least 6 in. of soft soil to prevent friction from rocks.

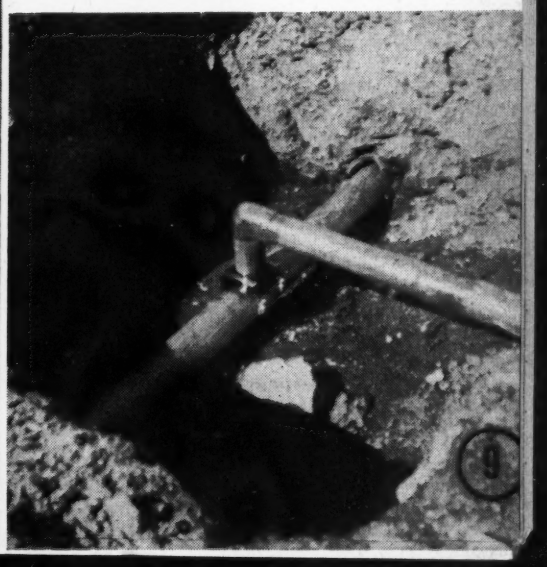
While the introduction of plastic pipe through steel services is not new—millions of feet of ⅝-in. OD and ¾-in. IPS have been used for this purpose by prominent utilities—it is believed the Avalon job is the first where 3-in. plastic pipe has been inserted in existing mains.

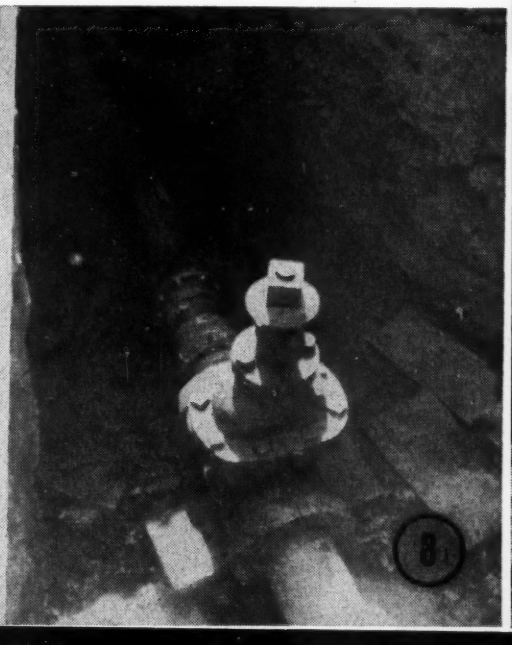
The plastic pipe used for this job was manufactured by PlastiPipe Inc. of Los Angeles. It is sold under trade name of "PlastiPipe." Technical assistance under the direction of Gordon Z. Greene was provided by the manufacturer. PlastiPipe is made from virgin Tenite II, a product of the Tennessee Eastman Corp.

Completely satisfied with its new plastic gas system, the City of Avalon intends to use plastic pipe to replace its present fresh water system. In addition, use of plastic pipe is contemplated to replace its salt-water fire protection lines. Different colors of plastic will be used for each system for easy identification.









At Waco, things might have been even worse, but . . .

Except for a relentless downpour bringing welcome rain to the central Texas area, the afternoon of May 11 was little different from any other day for employees of Lone Star Gas Co.'s Waco district of distribution.

Out in the Bells Hill area in the southern part of the city, employees were about ready to leave work at the company's new warehouse and service center from which they serve 30,000 gas customers in this city of 90,000.

But suddenly, at 4:36, the tar-colored clouds which had hovered all day massed and delivered what they had threatened.

Moving from a southeast to northwest direction, the deadly twisting winds of Texas' worst tornado gouged out a wide section in residential south Waco, pounded a section of downtown even harder and struck again in the homes across on the other side of the Brazos river, in what is called East Waco.

In the business area, mains and service lines as well as meters were ripped from their locations. Meters by the hundreds were damaged at residences and many more would have to be shut off because the homes were damaged beyond occupancy. And throughout the city, the toll of dead in the next 10 days mounted to 114 and damage rose to more than $50 million.

Stunned momentarily and hampered by damages to their own properties, Lone Star employees soon swung into action, displaying the same dogged determination as the many volunteer rescue workers who were already searching for survivors among the rubble. Compounding the hazards of the job was the lingering threat of fire and explosion for which the devastated city might fall easy prey.

The experience of Lone Star's veteran employees in the area was to pay off well in the days that followed. More than a dozen had accumulated more than 15 years experience in gas distribution. As a company engineer in the Lone Star headquarters in Dallas remarked on learning of the situation:

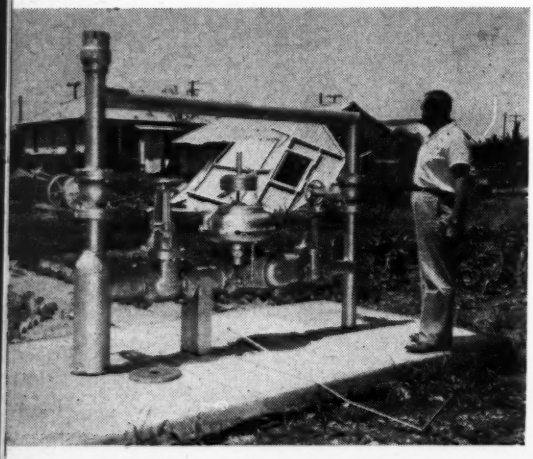
"Those men know every inch of the Waco distribution system. Some of them have 30 years experience and have been through other emergencies. They will know exactly what to do."

They did. And they worked fast.

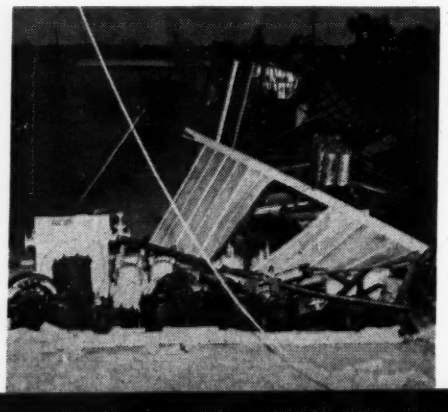
Hampered by power failure at the base station of their two-way radio communication system used in 19 cars and trucks in the district, they improvised.

The district plant engineer, sitting in his parked car at the company lot, began contacting and dispatching servicemen only minutes after the winds subsided. For five hours he was to direct operations until the base station was again activated.

Service and street department crews were dispatched downtown and set up temporarily in the alleys behind the



A tin shed housing a regulator station (above) was lifted from its foundation and fell 40 ft away.



Crumpled company garage, toppled by tornado, lies on creek bank.

large office buildings which had been hit hardest.

With the tornado came more and more rain and it flowed through the alleys and streets like a river. Company men began bagging off mains to isolate them.

In some areas downtown, however, the water rushed into the bell hole before workmen could uncover the mains. So men dug through the debris in the alleys searching out each meter with flashlights and one by one turned them off.

Later they moved back to higher streets to bag off the affected mains and isolate the areas for crews to make repairs and put the lines back into service.

Other crews began to methodically blanket the stricken area in East and South Waco to shut off residential meters and cap leaks. Using distribution maps, engineers made detailed notes of turnoffs and broken service lines to facilitate restoration of service in the shortest possible time.

Not only servicemen and street department employees, but also meter readers, salesmen, warehouse clerks, and other office personnel, including some from the company's division office also in Waco, joined in to meet the emergency and relieve the crisis.

In one instance in East Waco, a 900-ft section of 2-in. main was flooded and had to be replaced. Working in the fury of the rainstorm, which poured more than 7 in. on the stricken city in 24 hours, a company street department crew replaced the line with 4-in. pipe and restored service to 16 customers who were temporarily cut off.

May 11 was Monday, and it was Wednesday morning before the work slacked at all, and then only enough to permit the men to take a quick rest and check at home on the safety of their own families.

More than 115 men worked almost continuously for six days. By May 20, 10 days after the storm, servicemen were already restoring service to business houses, but only after the building, the gas meter and all lines had an okay from the city engineer. Other areas had been completely restored.

It was miraculous indeed, in the face of the widespread death and destruction, that there never were any fires or explosions.

When a survey was made, the company's own damage was estimated by the division office at more than $50,000. This included a company garage at the warehouse which was almost completely blown away; a regulator house lifted from its foundation and scattered 40 ft from the installation; a large plate glass window sucked out of the district office downtown; and damage to meters, meter loops, lids, and other installations.

The wife of one employee and the son of another were killed in the tornado—both by falling brick walls in demolished buildings.

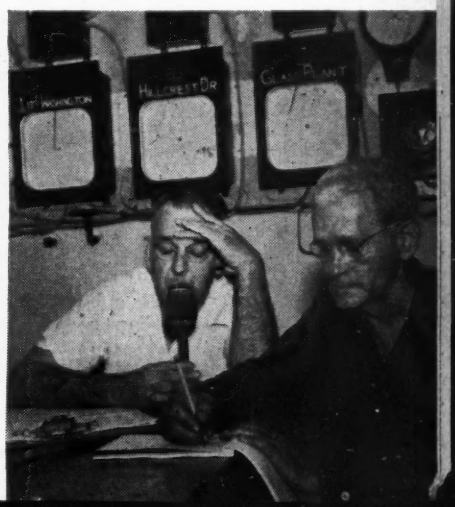
Lone Star presented the Waco Disaster Relief Fund with a check for $5000 and the company's personnel department in Dallas is still receiving pledges from employees all over the system for the "tornado relief fund."

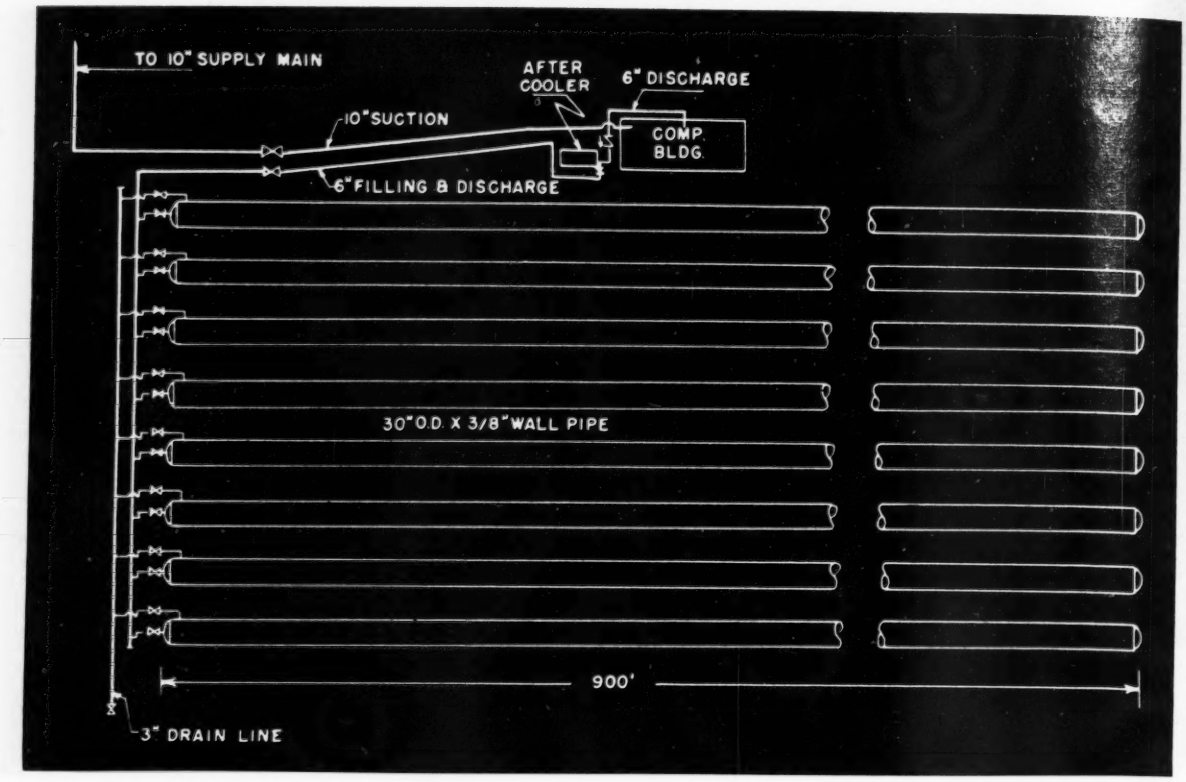
Round-the-clock vigilance prevented fire and explosion after tornado passed

From this car, using a two-way radio, the plant engineer directed emergency operations for five hours the first night until power was restored.

Digging for gas main to shut off the business area. The bagging-off method was used on several lines to isolate devastated sections of the city.

Weary dispatchers routed emergency calls after power was restored. They worked double shifts for the first few days to speed restoration of service.





Assuring integrity of welds in storage pipes with complete X-ray inspection

By **H. P. PRUDHOMME** • Coast Counties Gas Co., Santa Cruz, Calif.

TABLE 1. RESULTS OF TENSILE TESTS

(Made on coupons cut from girth welds on 30-in. pipe at 7th Ave., Santa Cruz)

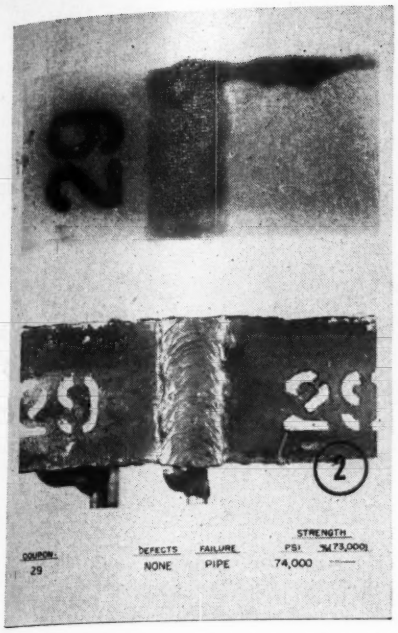
Test No.	Coupon	Defects	At Weld: Width (inches)	At Weld: Area (sq in.)	Results of Test	Strength: Lbs	Strength: %*
1	29	None	1 5/16	.50	Pipe broke at 37,000 lb	74,000	
2	22	None	1 1/4	.47	Pipe broke at 34,000	72,500	
3	25	Wagon tracks, poor penetration	1 1/16	.47	Weld broke at 30,000	64,000	88
4	24	No penetration	1 5/16	.50	Weld broke at 34,500	69,000	94
5	30 (3)	Poor penetration, bad void	1 1/8	.42	Weld broke at 23,500	56,000	76
6	20	High-Low	1 1/4	.47	Weld broke at 37,000	78,000	106
7	30 (9)	Wagon tracks	1 5/16	.50	Weld broke at 34,000	68,000	93
8	7	No penetration, wagon tracks	1 5/16	.50	Weld broke at 31,500	63,000	86
9	13	Poor penetration, high-low	1 3/16	.45	Weld broke at 32,000	71,000	97
10	71	No penetration, voids	1 1/4	.47	Weld broke at 30,000	64,000	88
11	27	Voids, series of	1 3/16	.44	Weld broke at 29,500	66,000	90
12	43	Wagon tracks	1 5/16	.49	Pipe broke at 34,500	80,000	

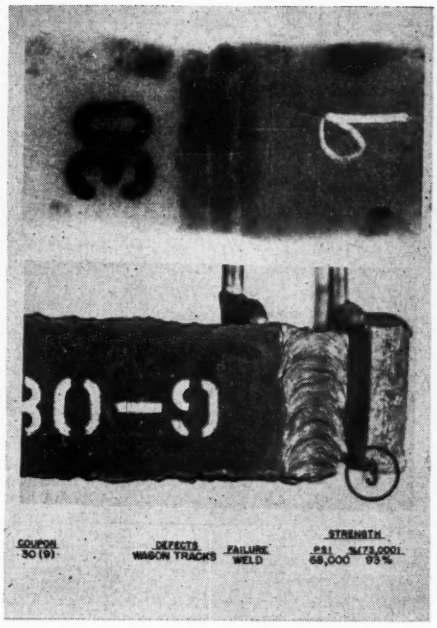
Notes:

Tests 1-10 were made Oct. 23, 1951 at the University of Santa Clara testing laboratory.
Tests 11-12 were made Nov. 2, 1951 at the University of Santa Clara testing laboratory after a hot pass was made around the girth weld inside the pipe.
*Percentage weld strength based on 73,000 psi maximum strength in pipe.

Definitions:

Lack of penetration is defined as the incomplete filling of the bottom of the weld groove with weld metal.
Wagon tracks are defined as elongated slag inclusions usually found at the fusion zone. A slag inclusion is a non-metallic solid entrapped in the weld metal or between the weld metal and the parent metal.
Voids are defined as gas pockets occurring in the weld metal, and are usually spherically shaped.





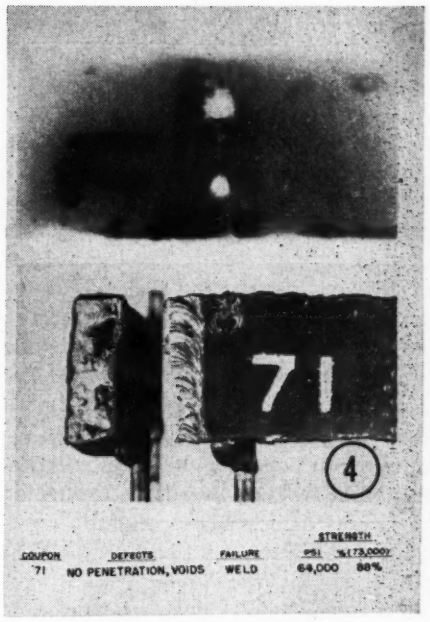
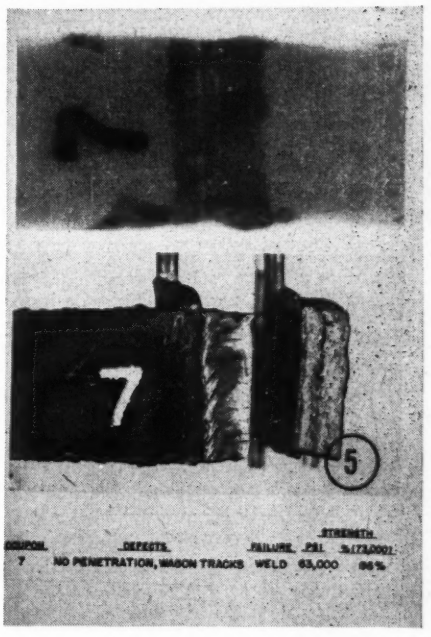
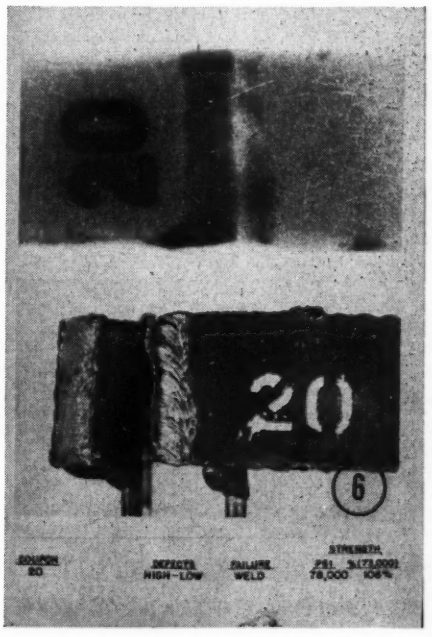


Fig. 1 (opposite page) shows the 1 MMcf emergency storage plant at Santa Cruz, consisting of eight 900-ft rows of 30-in. x ⅜-in. wall pipe and a 160-hp, single-stage compressor unit. This storage is connected to the 10-in. supply line serving the Gilroy-Watsonville-Santa Cruz area, with the terminus of the line in Santa Cruz. Above and right are Figs. 2 through 6, composite photographs of the tests.





A GREAT number of defective welds that looked good on the surface were discovered in our new pipe-type storage plant in Santa Cruz, Calif., when it was completed late last year. What brought them to light was a complete X-ray inspection of every field weld in the plant—an added expense but one that was well justified by the results obtained.

At the time of completion, our plans called for an ultimate pressure of 725 psig; and since the plant was to hold 1 MMcf, and was to be located in a strategic position, the inspection appeared advisable.

The X-ray contractor who was hired for the job took pictures of all girth welds and 17 in. of the longitudinal weld on each end of the 30-ft joint of 30-in. pipe. The results as interpreted by the X-ray company's engineer indicated the presence of a great number of defects in welds that, on the surface, looked good.

In order to evaluate the effect of each type defect so that a maximum acceptable limit could be established, 12 samples approximately 1¼ in. wide were cut from the girth welds representing the various defects present. Two samples of good welds were also taken as representative of standard specimens. An X-ray was made of each of the specimens and the specimens were ruptured by a laboratory tensile testing machine.

The results of the test are shown in *Table 1.*

Figs. 2 through *6* are composite photographs that show the X-ray of the weld, the weld itself, and the results of the tensile test. The defects evidenced on the X-ray film are clearly shown on the ruptured welds and the effect of the defect in all cases was a poor tensile test.

Fig. 2 is an example of a good weld. The X-ray shows the weld metal as a more dense medium, the greatest density being at the root of the weld where the greatest thickness is realized. Welds lacking in penetration do not have this dense root characteristic and they can be detected by the presence of fine dark lines which indicate the pipe contact at the root of the weld. Defects such as wagon tracks and voids appear on the X-ray film as dark* lines or spots since the X-ray emission meets with less restriction passing through gas pockets and non-metallic substances. *Figs. 3* and *4* are examples of wagon tracks and voids and *Fig. 5* is an example of lack of penetration, as well as wagon tracks.

High-low, as shown in *Fig. 6,* in the degree allowed in this project seemed to have little effect on the tensile strength

This article is adapted from a talk presented at the PCGA technical conference in San Jose, Calif., on April 28-29.

*The X-ray negatives, which are normally the final photographic results desired for this type work, show defects as dark or black lines. The figures contained in this paper were made up in part from positive prints from the X-ray film which gives them reverse density characteristic; that is, defects appear as light lines and dense media such as the weld root and the lead identifying number appear dark.

of the girth joint. The X-ray indicated an unbalanced weld. The weld density on either side of the root was lighter on one side than on the other. Our specifications allowed a 20% of wall thickness allowance in alignment.

The crawler unit used for the examination of the welds is shown in place in a 30-in. pipe in *Fig. 7*. The transformer is shown at the left and the 360° X-ray tube, although not visible, is in operating position at the front of the crawler. This self-propelled crawler, which automatically places the X-ray tube in position at the weld, is controlled by the operator at a remote location. According to the welding inspection contractor, the unit can operate successfully up to 2000 ft against grades and curves. The film holder is shown being placed at the girth weld by the X-ray technician in *Fig. 8*.

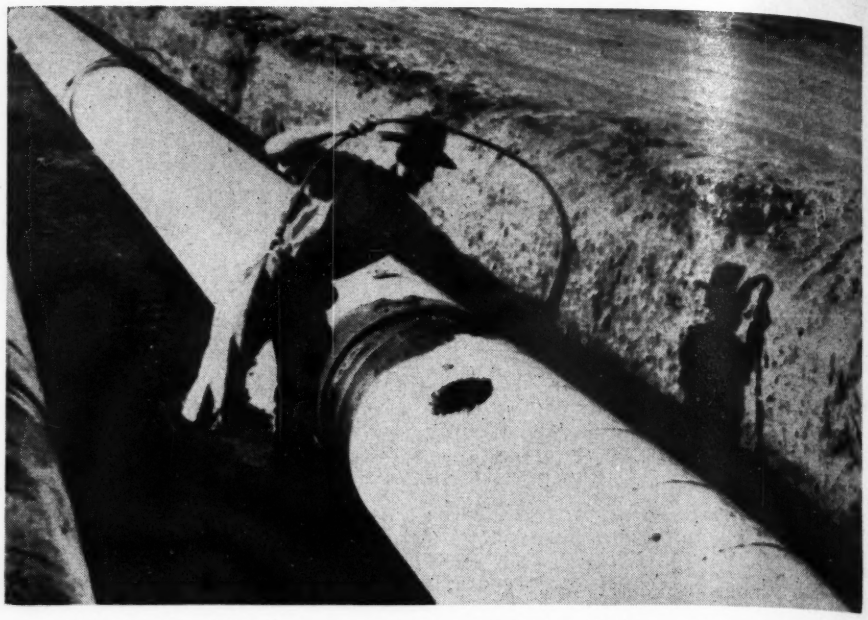


Fig. 8. The film holder is being placed at the girth weld by an X-ray technician.

Although our test was not extensive enough to be truly quantitative, it did indicate that lack of penetration, voids, and wagon tracks even in small amounts materially affect the weld efficiency. In order to bring the defective joints up to required efficiency, a complete internal hot pass was made on all welds showing the presence of either wagon tracks, where not too extensive, or lack of penetration. All larger slag inclusions, voids large enough and a series of small voids long enough were cut out and the joint was rewelded. In judging the size of defect and the length of a series of defects, the results of the series of samples were used as a criterion. The results shown for *Test 11* and *Test 12* are an example of the effectiveness of using an internal hot pass as a method of repair for wagon tracks and a series of small voids. For the former the repair was satisfactory and the specimen broke in the pipe. The specimen containing voids, however, exhibited only 90% weld efficiency.

In the recently published tentative "Standard for Field Welding of Pipelines," which was developed jointly by the American Petroleum Institute, the American Gas Assn., the Pipe Line Contractors Assn., the National Electric Manufacturers Assn., and representatives of pipe manufacturers and related industries, the section on radiographic inspection of welded joints clearly indicates the maximum amount and size of defect permissible in any one girth weld as agreed upon by all phases of the pipeline construction industry. Future use of this method of inspection will be greatly aided by this tentative standard. If such a mutually acceptable specification were available at the time of the construction of our storage unit, it would have been unnecessary to physically sample defective welds in order to establish a criterion of acceptance or rejection fair to both company and contractor.

The expense incurred by radiographically inspecting every girth weld and 17 in. of each end of all longitudinal welds was felt to be justified. For this type of storage, added assurance of complete integrity and quality of welded joints is essential because of the close assembly of a large mass of gas at a high pressure. The failure of only a small part of one pipe length could result in the destruction of the entire unit. Because of the fact that the field girth seams would be subjected to continued working stresses due to varying gas pressures and temperature changes, and because they would be liable to extraordinary stresses due to ground settlement and earth movements, including earthquakes, it was our belief that the normally accepted final hydrostatic test would not have been sufficient for this project.

Fig. 7. The crawler unit examines the welds in a 30-in. pipe. Transformer is shown at left.

GAS exclusive

Peoples Natural winds up program to odorize gas for 226,000 customers

By FRED REMINGTON

IN THE first week of May, the Peoples Natural Gas Co. of Pittsburgh extended its odorization program to the last 24,300 consumers within its system, culminating a 14-month project of systematically broadening the program which had begun in March of 1952 with a small experimental station serving some 1800 consumers.

"We began thinking about odorization in the fall of 1951," says Christy Payne Jr., vice president of the Peoples firm and also of New York State Natural Gas Corp. "The Texas gas we are using is largely odorless, so as the proportion of Texas gas goes up and the local goes down, our product tends more and more to lose its odor."

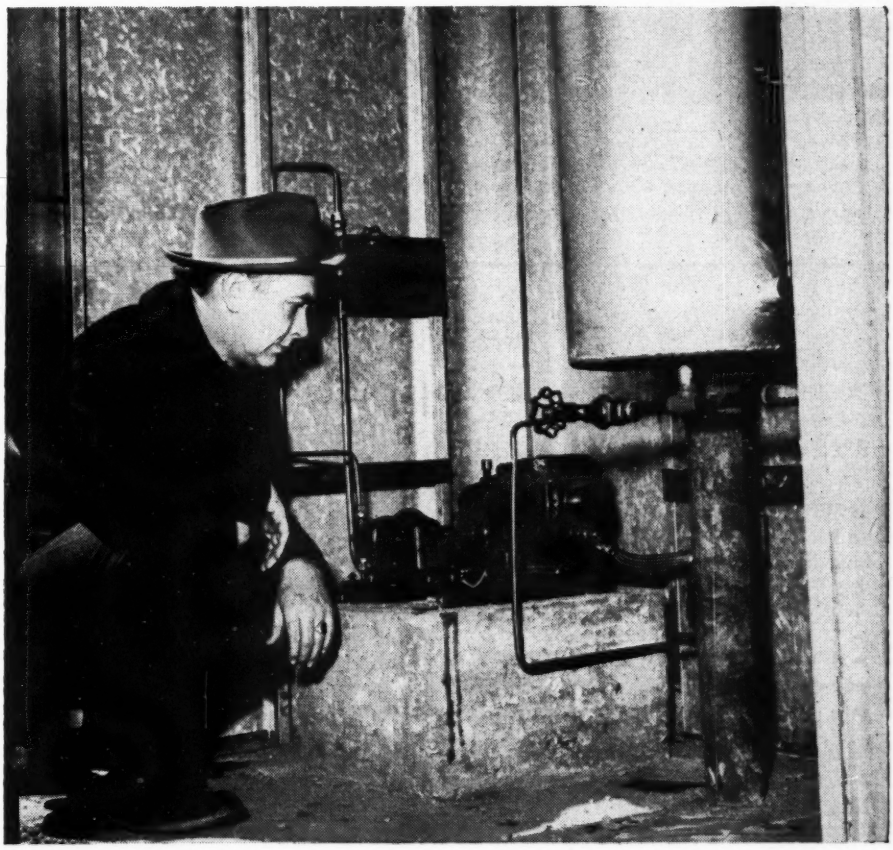
About 60% of the gas sold by Peoples now is imported, Mr. Payne said. The locally produced gas, which makes up the remaining 40% of the Peoples product, has the distinctive petroleum odor characteristic of gas of the Appalachian region.

"Our first step in the odorization program was a study of the system," Mr. Payne continued. "We mapped out where we would put the odorization stations."

Peoples serves 226,000 residential, commercial, and industrial consumers in heavily industrialized western Pennsylvania. The system extends from Tyrone, Altoona, and Hollidaysburg on the east to Midland, close to the Ohio border, on the west. Approximately 100,000 of its consumers are in the greater Pittsburgh area.

The company knew from the outset that its odorization program would have to be a progressive operation, rather than a simultaneous system-wide introduction.

The company's thinking in this connection was well explained in the company magazine, "The Peoples Voice," of March 1952:



Coxcomb Hill near Indiana, Pa., is one of the more than 15 stations of Peoples Natural that are used to odorize the company's gas; about 60% of the gas now sold by the company is odorless Texas gas. The 14-month project was begun in March 1952 at an experimental station in Midland, Pa.; it ended May 1 with the installation in Clarion county.

"Some have inquired as to why the company found it necessary to odorize gas in small doses—proceeding gradually from district to district—rather than on a simultaneous, system-wide basis.

"The explanation is that Peoples purchases gas from three out-of-state suppliers and approximately 750 independent operators who own 2067 gas wells in the company area. In addition, it produces gas from approximately 1200 self-owned wells. These independent and company wells are widely scattered throughout the Peoples territory, and gas from the wells enters the system at a number of different points. Odorization of gas from all these sources—to have the desired effect—should be uniform and of equal intensity. Consequently, for the Peoples system, at least 17—and perhaps many more—odorization points will be required."

The proposition that odorization would be carried out on a gradual, progressive basis having been established, the next consideration was where to begin.

The first step in the program was a study of the system, according to Mr. Payne, to determine sites for odorization stations.

"Our first aim was to get that Texas gas odorized," said Mr. Payne.

However, it was decided to begin with an experimental station to work out problems of odor intensity, public relations, and mechanics of introducing odorant to the system. The site chosen was Midland, Pa.; the date, March 1952.

Experimental operation

"Midland was a nice size for an experimental operation," said Mr. Payne. "About 1800 customers. And it takes a steady load because of the Crucible Steel mills there."

It had the added advantage of being just 20 miles from a point at which Peoples accepts gas from one of its two suppliers of Texas gas, the Texas Eastern Transmission Corp. and the Tennessee Gas Transmission Co.

Selection of an odorant was based on 13 requirements set forth by Dr. Rolla W. Miller, Peoples' director of research. These were:

1. The odor should be unpleasant, distinctive, similar to that of manufactured gas, and should not fatigue the olfactory sense rapidly.

2. The odorant should not condense out of the gas at pressures up to 1000 lb at 0° F.

3. The odorant should withstand transmission over long distances without appreciable change in odorizing strength or chemical composition.

4. The gas from underground leaks should retain its odor while passing through the soil for as great a distance as possible.

5. The odorant should be noncorrosive under all conditions encountered in the handling, transmission, and utilization of the product. This includes the liquid and vapors in the presence and absence of water and oxygen at temperatures ranging from atmospheric to those encountered in compressors and pilot lights.

6. The odorant should burn completely in the gas flame to form combustion products which are neither corrosive, irritating nor toxic in the resultant concentrations.

7. No immediate or cumulative harmful effects should result from inhalation of or contact with the vapors in either concentrated or diluted form. In addition, for the protection of odorizing personnel, the odorant should be relatively non-toxic as the result of ingestion or absorption through the skin in the liquid state.

8. In order to be adaptable to present odorizing equipment, the odorant must be very potent, with a normal odorizing rate of about 1 lb per MMcf of gas.

9. The delivered cost should be competitive with other odorants.

10. The odorant should not react with water or be appreciably soluble in it.

11. The odorant should have a narrow boiling range, for use in evaporative type odorizers.

12. The liquid odorant must not freeze at temperatures encountered in service.

13. The odorant must not act as a catalyst in the formation of gum or other undesirable products from other components in the gas.

Calodorant C Special, a product of Oronite Chemical Co., was chosen on the basis of the 13 tests.

Warned of complaints

"When we first considered going into odorized gas we were told by other systems that had tried it that we would be overwhelmed by complaints," recalls Richard J. Plank, Peoples superintendent of distribution. This company hoped by a sound and long range program of public relations and consumer education to hold the complaints to a minimum. While much data on customer reaction have yet to be compiled and interpreted, officials believe their preliminary steps did much to hold down the anticipated avalanche of complaints.

At Midland they evolved the program which preceded each successive introduction of odorized gas into the various consumer areas.

Well in advance of the inauguration of odorization, police and fire department officers of Midland were invited to a meeting with company officials.

"We brought samples of the odorized gas so they could familiarize themselves with the smell," said Mr. Plank. "You'd be amazed at how the information was disseminated as a result of its being placed in the hands of the police and fire officials."

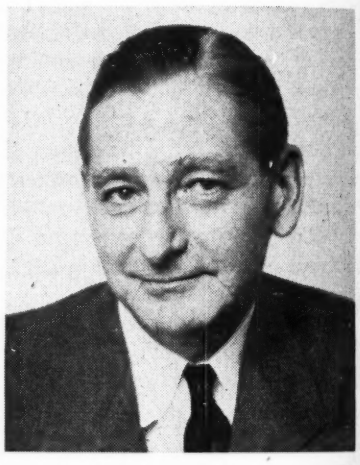
Public informed

Through paid advertisements in the local press and radio, the public was told something about the prospective odorization program, and the company public relations department fed an informative stream of matter relating to the program to editors.

Mr. Plank also believes that a gradual beginning is essential to a good public relations approach to the odorization program.

"We took a week or two to build up to the proper level of odorization," he explained.

And, of course, determination of the proper level was in itself a problem into which study and experimentation went.



Mr. Plank believes that "a gradual beginning is essential to a good public relations approach to the odorization program."

"The level we try to maintain is one part of gas discernible in 99 parts of air," said Mr. Plank. "You don't reach the combustible level until you get approximately 5% gas, so if it's recognizable at 1% you're reasonably sure to get complaints before any hazardous situation develops."

The desirable intensity was arrived at through lengthy tests with an odorimeter. This is a device which mixes gas and air in fixed proportions so that the concentration of odorant, at the stage where it becomes perceptible to the nose, is measurable.

Various concentrations of gas and odorant were widely sniffed by personnel throughout the Peoples organization, plus many housewives in certain designated test areas.

For its experimental station at Midland, the company used what had been a regulator station.

"We had to fabricate a pressure tank properly calibrated to hold the odorant," said Mr. Payne. "Then we installed a pressure equalizing system, much like the lubrication system on an automobile engine, to pressurize the odorant to flow into the gas stream in small quantities.

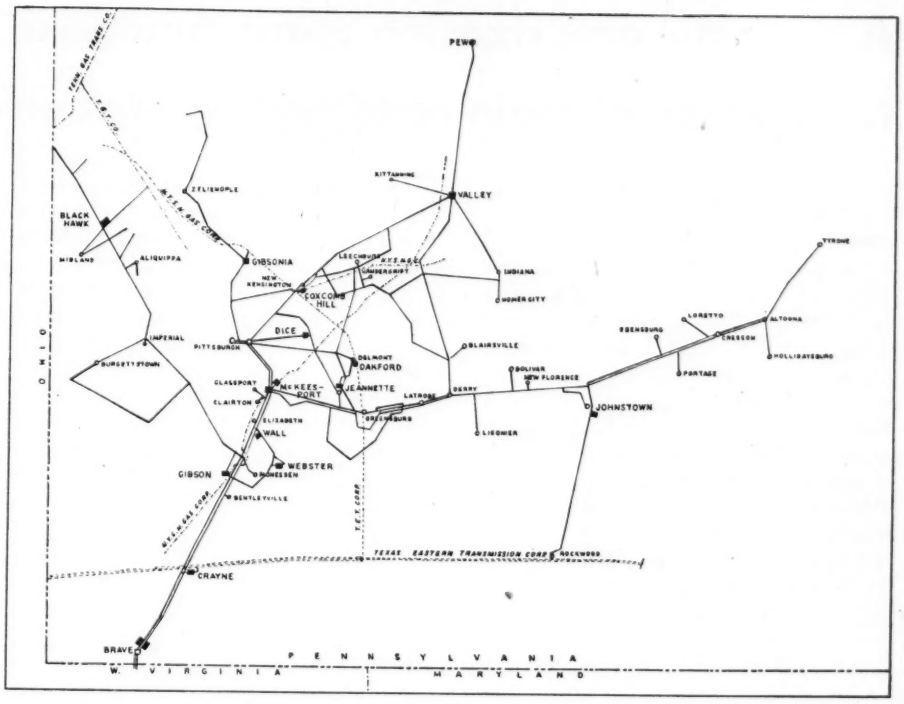
"The principal purpose of the experimental station was to determine the rate of injection, the degree of intensity wanted, and customer reaction."

The tank placed in service at Midland was designed to mix the gas and the odorant under about 60 psi.

On the basis of other companies' experiences, Peoples began by introducing Calodorant C Special at the rate of about half a pound per million cubic feet of gas. As a result of its own experience at Midland, Peoples increased this amount to about three-quarters of a pound per million cubic feet, which is the rate being presently maintained at all odorizing stations in its system.

From the small experimental station at Midland, which operated for about two months while Peoples worked the kinks out of its odorization process, the program moved to the Black Hawk station about 20 miles north.

The Black Hawk station, approximately 10 miles from the Ohio border, serves a little more than 13,000 consumers in the Midland-Aliquippa-Monaca area, with its dense concentration of steel mills. The station is one of the points at which gas is taken from the Tennessee Gas Transmission Co.



The map shows the odorization stations throughout Peoples' system.

It became the first automatic odorizing station in the Peoples system. The differential pressure system in operation here automatically sets the rate of injection of Calodorant C Special to correspond with the flow of gas. The unit was manufactured by the Peerless Manufacturing Co.

Thus on June 14, 1952, the western end of the Peoples system began using uniformly odorized gas. The program moved on according to the following timetable:

July 9, 1952—Gibson station in Washington county, a storage point.

Oct. 6, 1952—Rockwood station in Cambria county, where gas is accepted from Texas Eastern for distribution to 55,000 consumers in the areas in and around Altoona and Johnstown, Pa., the extreme eastern end of the system.

Jan. 15 and Jan 23, 1953—Brave and Crayne Farm stations in Greene county which distribute local and Texas Eastern gases to 110,200 consumers in Pittsburgh and its suburbs.

Feb. 27, 1953—Coxcomb Hill station in Allegheny county which distributes New York State Natural gas to 12,100 consumers in New Kensington and Glenshaw, Pa.

Feb. 27-April 1, 1953—Odorization extended to four stations in Allegheny and Westmoreland counties to cover different sources of gas (storage and local) than that covered by other stations noted above. These four stations, however, did not extend the market areas receiving the odorized product.

April 1, 1953—Gibsonia station in Allegheny county which distributed New York State Natural gas to 6200 consumers north of Pittsburgh.

May 1, 1953—Truittsburg station in Clarion county distributing local and New York State Natural gases to 24,300 consumers in the Kittanning-Vandergrift-Indiana-Blairsville areas.

Timetable for future work calls for:

Oct. 1, 1953—Oakford station in Westmoreland county, an acceptance point for New York Natural gas distributed to market areas indicated above.

Differing methods of injection are in use at the various stations.

Where electrical power is available, a pump injection system is employed. At stations remote from power sources, a pressure system employing the pressure of the gas itself is in operation.

The pump equipment is or will be in operation at the Gibson, Brave, Crayne Farm, Wall, Coxcomb Hill, Valley, McKeesport, Oakford, Gibsonia, Dice,

EQUITABLE LAUNCHES ODORIZATION PROGRAM

Another Pittsburgh gas utility, Equitable Gas Co., recently installed its first odorization unit at the Bradford Wood station to odorize natural gas flowing into the Pittsburgh area in its lines.

Bradford Woods, the first of seven locations where similar facilities will be installed, odorizes gas for the North Side area, including West View, North Hills, Bellevue, and neighboring communities. Calodorant C Special is being used throughout the system.

Automatic ordorization plant functions for Transco at main conditioning station

By H. L. CLINE
Transcontinental Gas Pipe Line Corp.
Houston

Two major complaints at our original mainline odorization plant near Downingtown, Pa., forced us to redesign the plant within the first year. First, the piston pump packing could not be kept tight, thus allowing odor vapors to escape and, second, a full-time operator was necessary to manually adjust the pumps. Four men were required to operate and maintain the plant.

Operation continued for a year until the Downingtown plant was replaced by a new, improved type plant located near Malvern, Pa., where all gas sold in the Philadelphia-New York area is conditioned.

The plant is at Station 20 and the odorant is injected directly into the main gas flow on the discharge side of the station. One injection is into the 30-in. mainline, and the other into a large lateral line, both lines being operated at a pressure of 750 psig. A separate and complete odorization unit was installed for odorizing the gas in each of these two lines. Standby equipment is also available for either system.

The odorization equipment is housed in a 14-ft by 16-ft brick building. There are no windows in the building and ventilation is obtained by a fan exhausting through reactivated carbon filters. Since carbon absorbs the odorant, these filters prevent the possibility of any odor being discharged into the atmosphere.

The principal equipment of this odorization plant consists of: (1) Pitot-venturi flow elements, (2) pressure control transmitters, and (3) electric motor-driven diaphragm "pulsafeeders."

The pitot-venturi flow element is installed in the main gas line upstream from the point of odorant injection. This element is connected through the pressure transmitter to a control mechanism on the pulsafeeder. Variations in the gas flow rate effect a change in the pump linkage, causing it to feed proportionately more or less odorant into the gas.

The pitot-venturi, a typical flow element, consists of two concentric venturi tubes arranged so as to measure the average gas velocity in the pipeline. The outer tube measures the impact pressure, and the inner tube measures a pressure slightly less than the static pressure. This differential across these tubes is proportional to the rate of flow, and is translated into units of flow by an indicating meter.

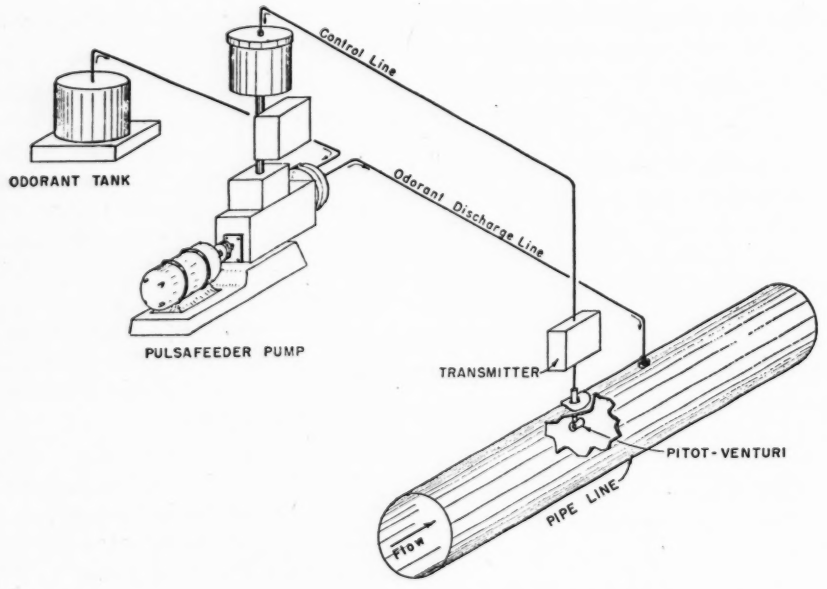
The pressure control transmitter is installed on the indicating meter to develop a control pressure proportional to the meter reading. This pressure controller is connected to, and controls automatically, the operation of the odorant pulsafeeder. Thus, the rate of injection of the odorant is always in direct proportion to the flow of gas, even though the flow of gas varies.

The pulsafeeder is a combination piston-diaphragm pump. The piston reciprocates in a cylinder at an established stroke length to displace an exact volume of oil. Oil constitutes a hydraulic linkage and moves a diaphragm alternately forward and backward. The displacement from this diaphragm travel in turn takes in the odorant through a check valve on the suction stroke of the piston, and discharges a like amount of odorant through another check valve on the forward or discharge stroke of the piston. This type odorant injector was chosen because it does not have any stuffing box packing to cause odorant leakage with resultant annoyances. It was also chosen because its variable linkage permits automatic operation.

A three-month supply of odorant, approximately 5000 gals., is purchased in bulk and stored in five underground steel tanks. Purchasing in tank truck quantities makes the odorant much cheaper and expedites its handling.

From the steel storage tanks, the odorant is transferred by gas pressure to a three-day supply tank located inside the equipment house.

Since this odorization plant is fully automatic, it gives adequate, but not excessive, odorization with little labor, making its operation both economical and satisfactory.



Principal equipment in the automatic odorization plant.

Portion of a talk presented at the AGA production and chemical conference, May 25-27, in New York.

Webster, and Jeannette installations.

Differential pressure plants are used at Black Hawk and Rockwood.

The foregoing installations, requiring, in some cases, construction of new housing for the equipment and purchase and installation of equipment, represent an investment of approximately $100,000, Mr. Payne reports.

He estimates that the yearly cost of maintaining the odorization program will run close to 1% per million cubic feet of gas.

With regard to the volume of complaints which odorization brings upon a company, Peoples is still too new in the field to make any very positive or definite statements.

"I would say," reports Mr. Plank, "that complaints are up but nothing like what we had expected."

He adds that the company has had no complaints on the score of the odorization stations themselves. When the program was put into effect, personnel handling the odorant at these points was emphatically cautioned against any careless handling which might result in spillage, with resultant annoyance to residents near the stations. The odorization program required the training of some 50 of Peoples' 1800 employees.

While much of Peoples experience in the odorization field has yet to be appraised and evaluated and many problems remain to be solved, Mr. Plank says the company's reaction may thus safely be summed up: "We are very pleased with the results."

Miles of extruded Tenite cellulose acetate butyrate plastic tubing now deliver gas from mains to homes. Flexible Tenite lines are a quick answer to many service replacement problems. They can be inserted in existing steel casing, thus eliminating ditching and other time-consuming labor.

The ½-in. tubing comes in lightweight 200-ft. coils which are easily handled by one man. A few strokes with a saw cut it to desired lengths. In gas line installations it gives long service unaffected by corrosion or electrolytic action.

gas service lines

Tenite is also in wide use for corrosion-resistant pipelines conducting oil, salt water, and other liquids. The tough plastic, either opaque or transparent, is extruded in a variety of pipe sizes.

For more information about the use of Tenite for pipe, fittings, and numerous other extruded or molded applications, write—
EASTMAN CHEMICAL PRODUCTS, INC.,
Kingsport, Tennessee,
sales representative for
Tennessee Eastman Company,
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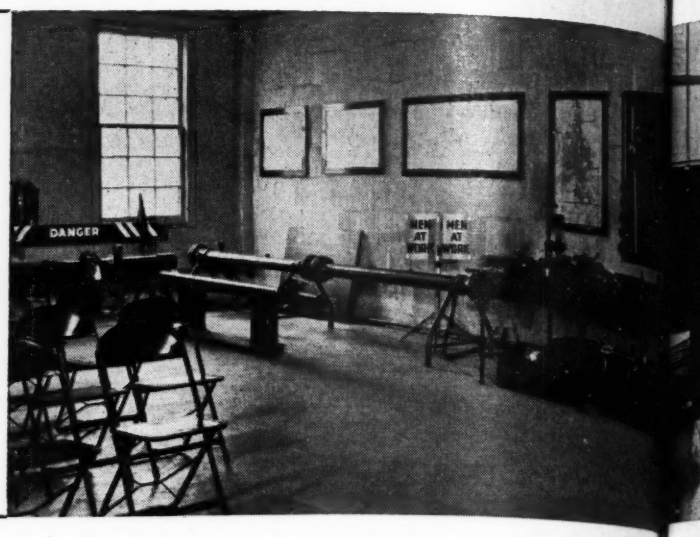
- Information regarding Tenite is also obtainable through representatives located in Chicago, Cleveland, Dayton, Detroit, Houston, Leominster (Mass.), Los Angeles, New York, Portland (Ore.), Rochester (N. Y.), St. Louis, San Francisco, Seattle, and Washington, (D. C.); and elsewhere throughout the world from Eastman Kodak Company affiliates and distributors.

Job and classwork combined to train street personnel



Consumers Power believes that the best results can be obtained by combining on-the-job training with classroom schooling. In this large room are housed the models and props used in the program, including drilling and tapping machines, tools, maps, and section of main which can be pressurized with compressed air so main can be drilled and tapped under pressure.

By D. E. BARTHEL
Consumers Power Co., Flint, Mich.

EMPLOYEE training is only now beginning to drop into its place in the scheme of things in the gas industry. We have had to develop our own techniques, and this has required time and much effort. In our company we believe we obtain the best results by combining on-the-job training with classroom training. This is accomplished by conducting small group classes in a room specially equipped for gas street department training. We use the old water exhauster room at the gas plant. The room is about 40 ft square, making it a comfortable size for meetings and training purposes. The general arrangement is shown in photos.

Exhibits used are maps of our transmission lines and distribution systems, suppliers' catalogs and drawings of equipment, company standard of construction, company record and order forms, and company safe practice rules.

Materials consist of fittings with correct descriptions and stock numbers, tools and equipment used by street department employees and assemblies of various types of services and meter installations.

Classes are normally limited to not more than eight or 10 employees and in most cases entire crews receive the same training. We believe this method of instruction better qualifies them to work together as a team on the job. Meetings usually lasting four hours with a short recess, are conducted by supervisors who are assisted by technicians and engineers.

In general, any employee training program should start with supervisory training, which should include a discussion of the responsibility of the supervisor for training those reporting to him. We have done what our company considers good supervisory training in having supervisors attend Sales Analysis Institute training classes. This training consists of about 50 four-hour meetings on the subject of human relations. Our weakness might be in the follow-up of our training, and the fact that newer supervisors have not attended training classes. Teaching invariably broadens the supervisor, and the contact with the employees in the classroom improves the relationship existing between them.

Unique position

Most important of all, the supervisor-instructor is in a unique position to see to it that all ideas for improved methods of employee performance, as developed in the classroom, are put into practice by the employee on the job. Our programs, while in outline form, also include group discussion of methods, materials and equipment. These discussions frequently result in the development of improved work methods. A brief summary of our planned program follows:

The first meeting is opened by an explanation of the purpose of the program. During this meeting, maps are used to help describe the origin and transmission of natural gas. Underground storage and final delivery to city gate stations is explained so employees will have a general idea of this part of the business.

Physical and chemical properties of natural gas are discussed, touching on such subjects as:

Btu content.

Expansion or contraction of gas as affected by temperature or pressure.

The explosive limits of natural gas and air mixtures.

The fire hazard inherent when working in the presence of gas.

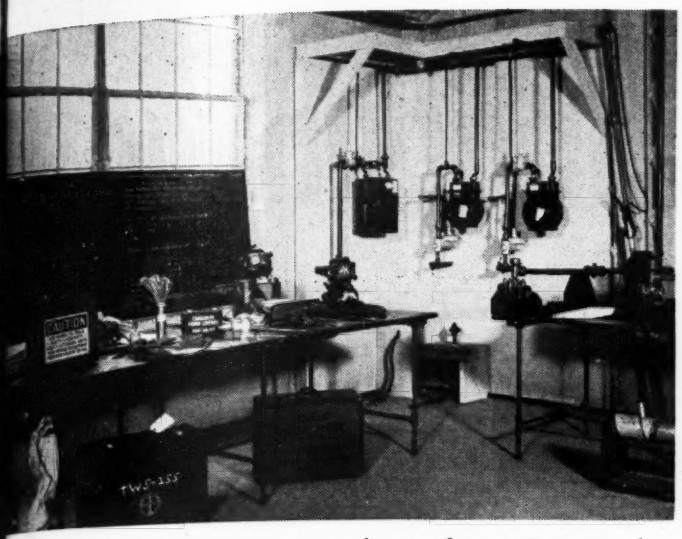
The effect of inhaling natural gas.

The reasons and methods for cleaning, odorizing and treating gas when received from supplier are explained and a general outline of distribution regulator stations given.

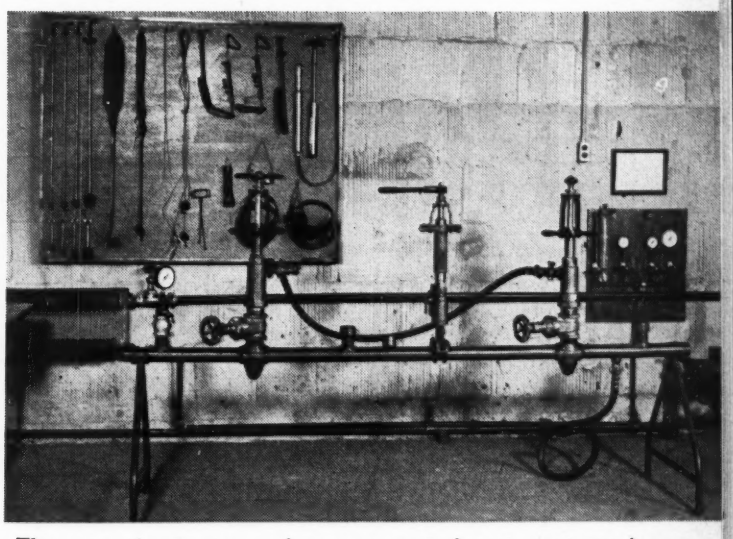
The distribution system is described and maps used to show the layout of the system. This is followed by statements about pressure and an outline of pressures maintained in various parts of the system.

The second meeting comes closer to the actual work being done by the employees. It is outlined to explain the installation and renewal of gas services.

One of the most useful devices for this phase of training is the group of model services of the various types used, assembled exactly according to our construction standards. These models are taken apart and re-assembled by employees. The discussion during this part of the meeting includes detailed descrip-



This section of the training room shows safety equipment and the model gas services and meter installations used for classroom demonstrations.



The gas main stoppers and pressure control equipment can be pressurized with compressed air, to simulate conditions encountered on the job.

tions of No-blo service tees, service regulators and relief valves, over-pressure and over-temperature shutoff valves, and descriptions of other fittings used to properly install or renew a gas service.

Much time is devoted to explaining the causes of corrosion, stressing the importance of carefully handling coated pipe, patching damaged coating, and protecting exposed parts of services.

Holiday detectors

The use of the holiday detector is explained and employees instructed by actual practice. Methods of pressure testing services are practiced and our company rules pertaining to testing services discussed in detail.

Our policy of plugging and sealing in closed position all lockwing stops and meter bars, before issuance from the storeroom, is explained and the safe practices rule which requires street department employees to install the stops as received is stressed.

Model meter installations are examined so the street department employee can understand why he should do his part of the job according to standard specifications, thereby reducing costly, unnecessary work by the shop department.

A discussion of sod removal, augering, hand trenching, machine trenching, backfilling and final clean-up is conducted for the purpose of emphasizing the importance of ultimate customer satisfaction.

The third meeting consists of instruction about the installation of gas mains. It includes descriptions of all types of mains, joints and fittings. Here again, the use of cut-away models and actual fittings used on the job are found to be very useful. A discussion is conducted covering such subjects as:

Excavating
Bracing trenches
Barricading and placing warning signs and lights
Handling pipe (with special emphasis placed on handling coated steel pipe)
Cutting pipe
Safe methods of lowering main into trenches
Making joints
Laying pipe to grade
Installing drips
Pressure testing
Protective coating
Tieing in to live mains

Stoppers

The use of stoppers is demonstrated and practiced under pressure by using compressed air in short pieces of main. During this part of the instruction employees also tap mains, install stoppers, remove stoppers, install plugs in stopper holes, and test with soap suds for leaks, while air pressure is maintained in the main.

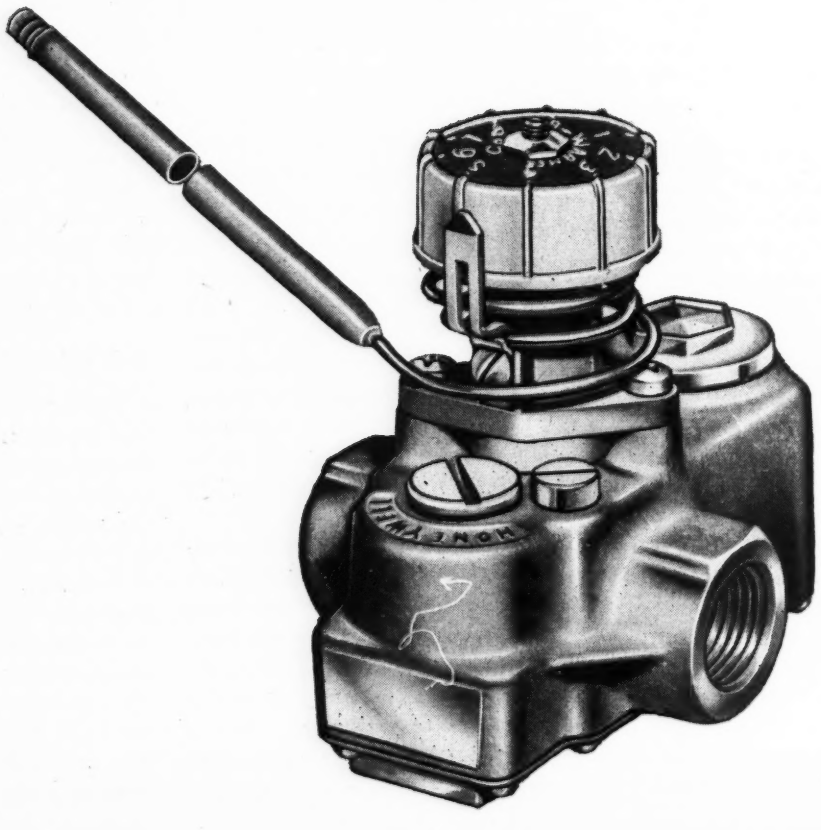
The use of compression fittings is explained and various types of fittings are disassembled, then installed on mains and air tested for tightness. The discussion includes other phases of street department work, such as installing casings under railroads or pavements, coating and wrapping mains and fittings, the use of earth boring equipment, methods of tieing over service to live mains, abandoning retired mains and services, and methods of backfilling.

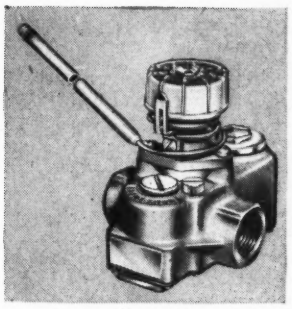
The fourth meeting deals with corrosion mitigation and maintenance work. During this meeting the use of combustible gas indicators, pipe locators, curb box locators, shepherd rods, gas masks, safety harness, fire extinguishers, and emergency stoppers are demonstrated and practiced by actual use. Methods used to locate mains and pin point leaks are described and various causes of leaks explained. The reasons for corrosion are discussed, with special emphasis being placed on the importance of careful handling of coated pipe and spot coating holidays and exposed metal. The use of magnesium anodes and insulating couplings is explained and demonstrated. Special fittings which are used to repair leaks are disassembled and then placed on mains under air pressure and tested for tightness.

Bell joint clamps

During this meeting employees are also shown the correct method of installing and testing bell joint clamps. A section of main which includes a bell-and-spigot joint provides a means for practice installing clamps. Actual practice enables the supervisor to place emphasis on the need of properly cleaning and facing the old joint before installing compression ring. Torque wrenches are used and clamps tested for tightness by the knife blade or trowel point method. The importance of doing a good job is stressed with emphasis placed on the

Honeywell announces the MODUSNAP - a revolutionary new automatic gas valve





1. *Modusnap can be used with all types of gas heaters*
2. *Combination modulation and snap action – literally two valves in one*
3. *Eliminates over-heating during mild weather*
4. *Improves air circulation – helps eliminate "layer-cake" heating*
5. *Excessive on-off firing eliminated*
6. *Increased firing efficiency*
7. *Added fuel economy*
8. *Quick, easy installation*
9. *Suitable for all gases*
10. *Wide range of applications*
11. *Safe, convenient lighting with the C585 Pilotstat*

Honeywell's great new automatic gas valve–the Modusnap – is now available! The Modusnap is really two valves in one–a modulating valve in cold weather and a snap-acting valve in mild weather.

In cold weather, the valve modulates the gas supply between minimum flame and the maximum input of the heater as required by the heat load.

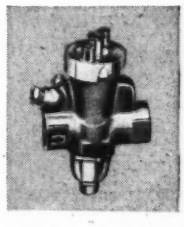
In milder weather as the heat load decreases, the snap action valve comes into play, cycling the burner on and off *on minimum flame.* Finally, as heat demand decreases beyond the point where even minimum flame is needed, the valve snaps shut completely.

Thus the Modusnap combines into one valve all the advantages of both modulating and on-off type controls. In mild weather, the on-off action overcomes the over-heating problem so common to conventional modulating controls, and in colder weather the modulating action provides virtually continuous air circulation and helps to eliminate "layer-cake" heating brought about by ordinary on-off type action.

Installation is quick and easy. Modusnap's compact design, plus the fact that it requires *no* electrical wiring, makes it easy to install.

Modusnap is suitable for all gases – natural, mixed, manufactured or LP. It's designed to control most types of domestic gas heating equipment, with a wide range of applications: all types of room heaters, wall heaters, conversion gas ranges and floor furnaces.

Added feature



When the Modusnap is installed with Honeywell's C585 Gas Cock Pilotstat (at right), safe, convenient lighting with 100% safety control and manual shut-off is obtained.

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Supplies of miscellaneous joints, fittings, and materials are kept on hand for the class devoted to instructions in installation of gas mains.

fact that an improperly installed clamp can later result in a leak, even though the joint is tight at the time the job is completed.

Our safe practice rules for the street department employee referring to "leak surveys" and "leak investigation and repair" are reviewed. Special emphasis is placed on the importance of testing surrounding areas after a repair has been made to insure that no other leaks exist. The care and use of air tools is discussed during this meeting with emphasis placed on the safety of the worker. This meeting usually develops into panel type discussion which becomes very informative. Many of the men are very resourceful and much valuable information is gained from the discussion.

High pressure equipment

The fifth meeting deals with the high pressure control equipment. To enable employees to learn how to operate high pressure control equipment correctly, we have assembled a short section of main, operated with compressed air at pressures up to 100 lbs. Pressure control equipment is attached to the main and employees install stoppers and bypasses under conditions practically identical to those encountered on the job. Catalogs and diagrams are helpful in explaining the details of this equipment. Instructions include precautions to be followed to prevent injury to employees or damage to equipment, such as equalizing pressure before removing stoppers to prevent damage to stoppers, being certain that completion plug is properly seated before removing valve, and cautioning employees about the piston effect of the stem used to operate tools inside the pressure chamber.

Special emphasis is placed on the need of a pressure gauge on the downstream side of equipment and bypass lines. This gauge, as you know, should be connected directly to the main so the operator will at all times know the exact pressure in the main. A gauge placed in the bypass system can show a reading different from the pressure in the main, which could result in the loss of pressure to a system. Towns have been lost because of someone's mistake; therefore we always insist on a gauge being placed in the system to be supplied through the bypass.

The sixth meeting covers reports compiled by street department employees. Instruction during this period consists of discussion and practice in the correct interpretation of work orders and engineering drawings, compilation of reports, such as work orders, retirement orders, stores issue tickets and daily time report sheets. Enlarged report forms painted on blackboards are used and have been found to be very practical. Considerable time is devoted to discussion of various charge accounts and company policies which affect the work of street department employees.

This is the last scheduled meeting; therefore a brief review of previous meetings is presented and after asking pertinent questions the supervisor conducts an open discussion period during which employees can ask questions.

Before the meeting is closed, emphasis is placed on the importance of using safety equipment, doing each job as well as is practical, and striving for customer satisfaction by performing duties in a good, safe, workmanlike manner.

While we are just completing our first year's experience with the training program, and it is still in somewhat of an experimental stage, we believe it has been very helpful in accelerating training and promotions which were necessary because of a large construction and maintenance program. Our street department personnel (Flint division only) was increased from 100 to about 150 employees during 1952, and will probably be increased nearly as much during the current year.

Safety for the employee, for the public, and for customers is stressed throughout the entire program. We have enjoyed gratifying results from this part of the training. Our last disabling injury occurred in November 1951, and our distribution department is nearing that much sought-for *one million man-hour accident-free* record.

The instructions not only reduce or avoid costly mistakes, but they go a long way toward promoting good employer-employee relations, and are very beneficial in bringing about ultimate customer satisfaction.

Constant program

We are hopeful that sufficient money will be available to allow us to keep a reasonably constant training program in effect. I wish to repeat that bringing employees back for review, detailed instruction on subjects not thoroughly covered during scheduled meetings and special instruction about improvements, keeps them up to date and helps keep an organization alert.

We need more training and discussion of customer contact, customer satisfaction and public good will which I hope will be forthcoming. To see our employees, to talk to them takes time, and time seems to be the one thing that is in short supply. Informal discussions must encourage employee reaction, criticism, suggestions and free expression of opinions or many helpful ideas will be missed.

No greater personal satisfaction will ever come to a man than through self-confidence in his ability to perform a task with the skill of an expert.

The practice of care and attention that makes men skillful can also make them safe and efficient workers.

This article is adapted from a talk presented at the distribution, motor vehicles and corrosion conference in Chicago, April 13-16.

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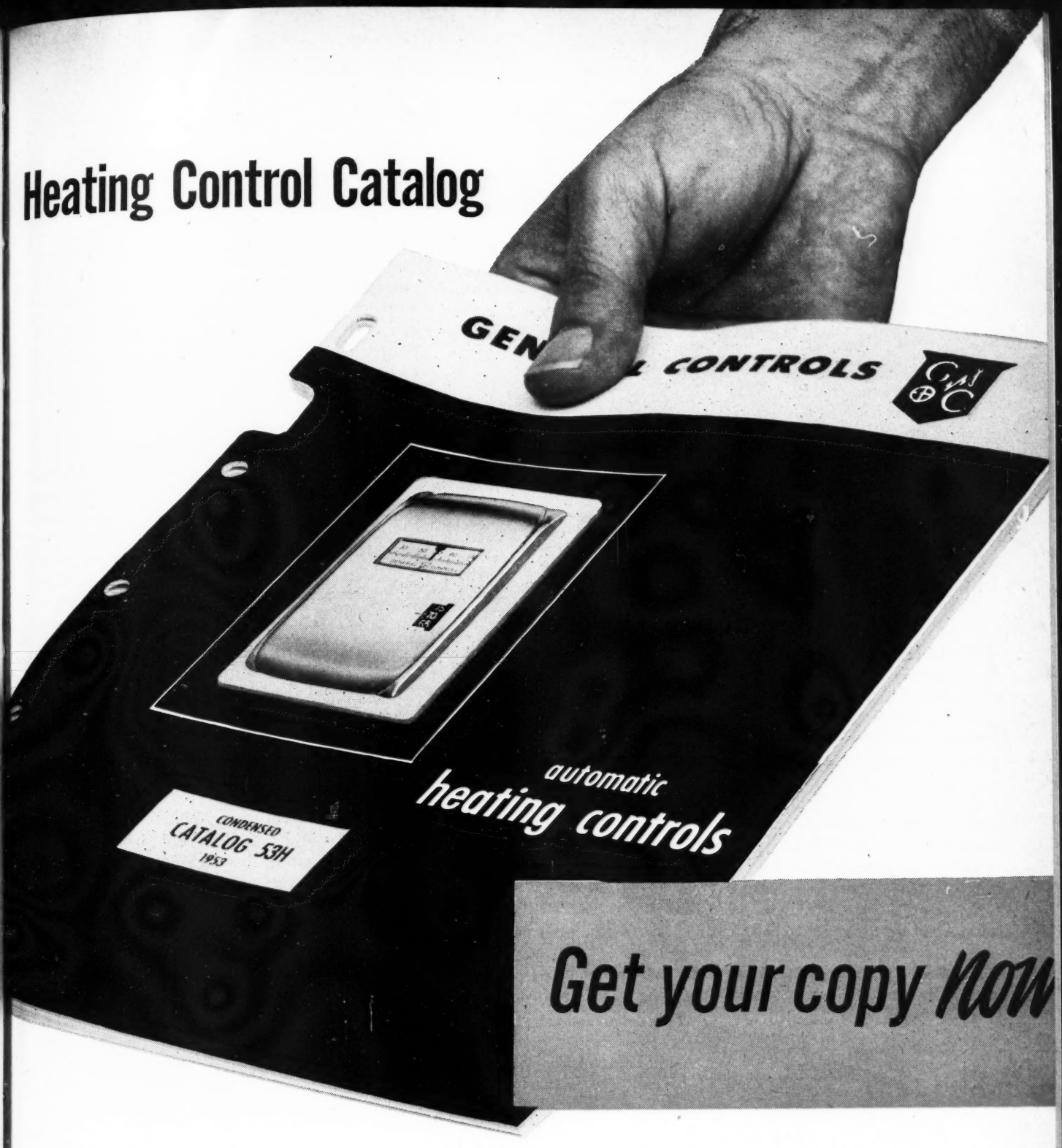

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TYPES OF GASES USED IN PHILADELPHIA

Gases	Btu	Sp Gr	Availability
Coke oven gas	530	0.40	
Carbureted water gas	530-700	0.67-0.69	
Producer-blue gas	130-230	0.90-0.68	Before June 1948
Natural gas (cold enrichment)	1050	0.615	
Reformed natural gas	320-420	0.62-0.55	
Modified natural gas	530-700	0.81-0.74	
Catalytic cracked natural gas	230-280	0.66-0.48	Added after June 1948
Butane (cold enrichment)	3100	2.00	
Modified butane	650	1.20	Added 1951
Catalytic cracked kerosene	700	0.613	
Oil gas	1000	0.855	Added 1953

How to control sendout quality with 11 gases

By **R. A. SLOAN** • Philadelphia (Pa.) Gas Works Div.

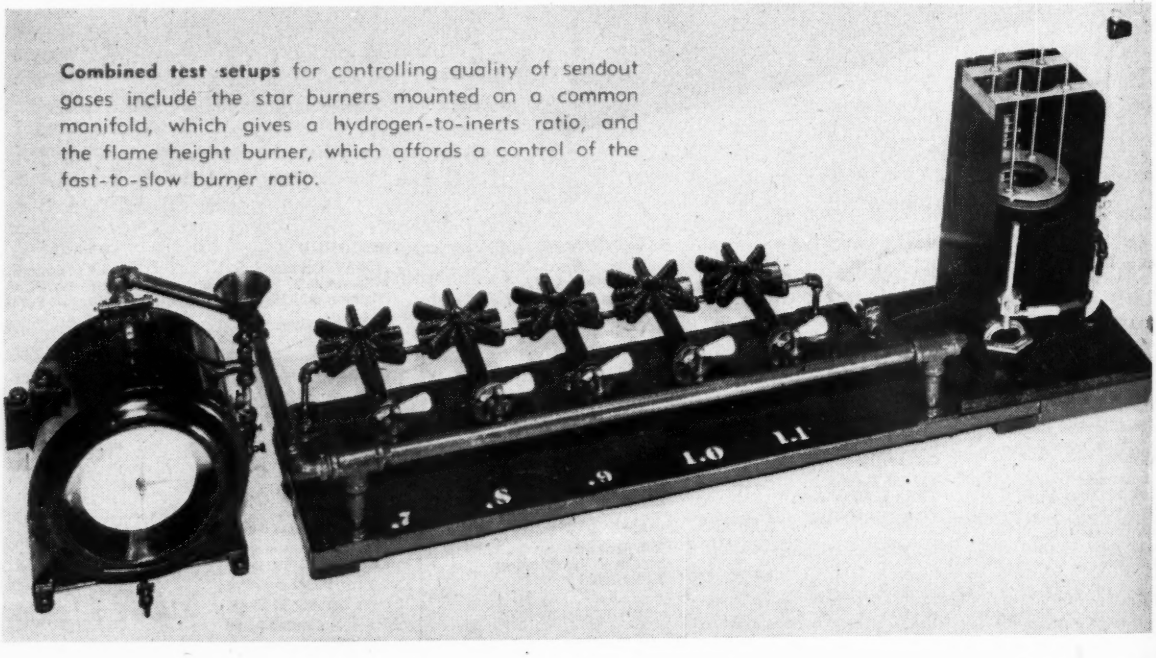
CONTROLLING the quality of fuel gases to insure satisfactory burner adjustments and unimpaired appliance operation the year around is not a troublesome problem when straight base gases are being served, but the introduction of natural gas and other gases, such as has occurred in Philadelphia in recent years, can cause a great many interchangeability problems.

In our company, the answer to the problem was to adapt for purposes of quality control the two test setups used during the extensive interchangeability tests conducted before the arrival of gas. These were the devices for testing fast-to-slow burner ratio and hydrogen-to-inerts ratios, and they provided the instantaneous determination of ratios needed for real control.

Quality control is, of course, a necessary step in maintaining good customer relations and keeping service calls at a minimum; and it is especially important that flame size and temperature be kept constant in certain delicate industrial operations. Before the advent of natural gas, we put out a 530 Btu, 0.67 sp gr manufactured gas composed of approximately 80% carbureted water gas and 20% coke oven gas. This gas was controlled, as in most manufactured gas companies, by simply observing the heating value and the specific gravity, and little trouble was experienced in maintaining a given quality gas on the town. Chemical analyses of the holder inlet and commercial gases were taken at periodic intervals as checks on the quality of the gas and for record purposes, but were never used for control.

But the coming of natural gas in the summer of 1948 changed all that. Interchangeability tests conducted by the appliance laboratory on synthetic mixtures of constituent gases before natural gas was available showed that gases could be made by using natural gas in several different ways, with the same heating value and specific gravity, and yet not be interchangeable. This was caused by the rather radical changes in chemical composition that took place when the percentages and types of gases in the final mixtures were varied.

The table shows how the types of gases available in Philadelphia have increased since the introduction of natural gas, from three to nine with an addi-



Combined test setups for controlling quality of sendout gases include the star burners mounted on a common manifold, which gives a hydrogen-to-inerts ratio, and the flame height burner, which affords a control of the fast-to-slow burner ratio.

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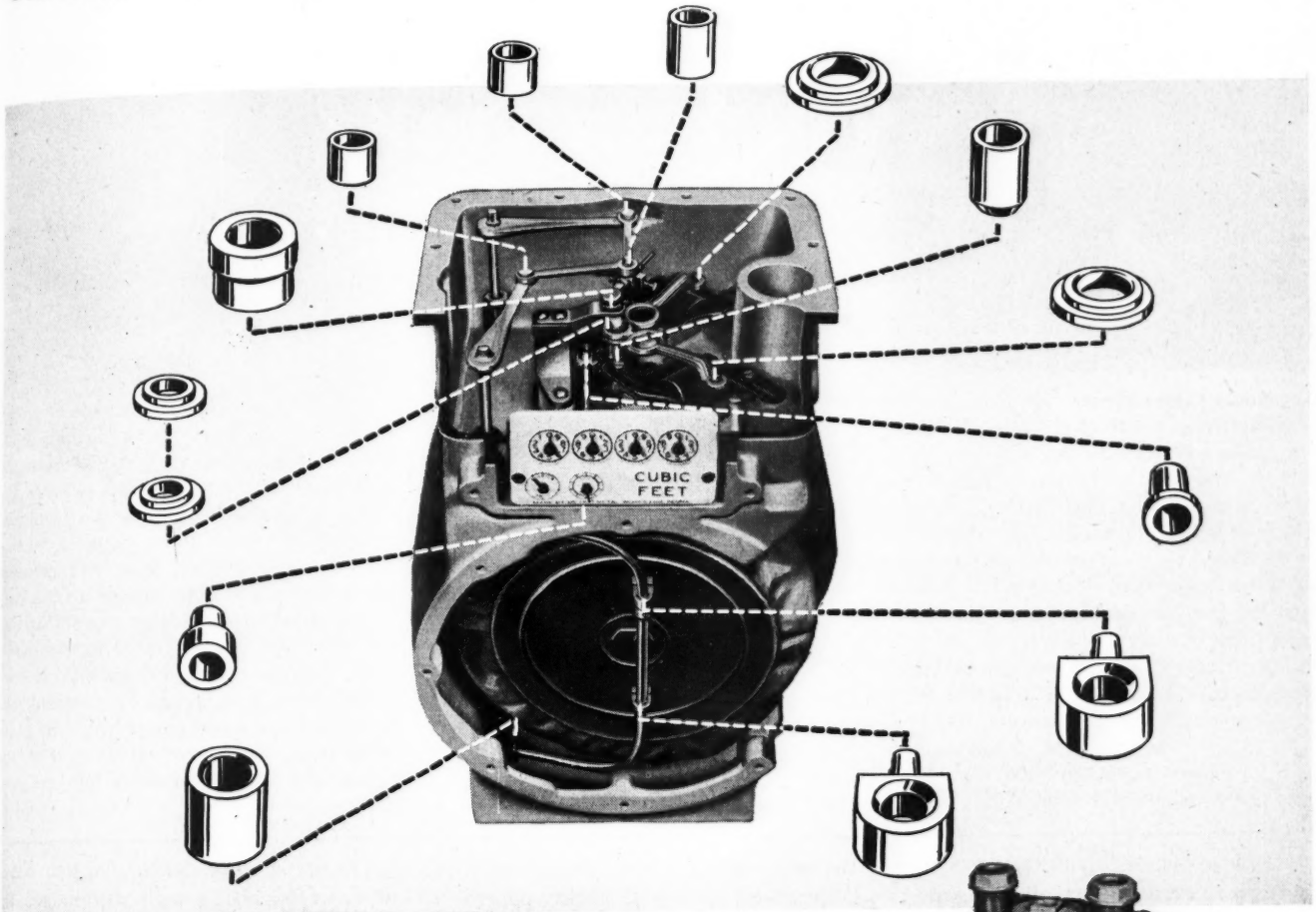

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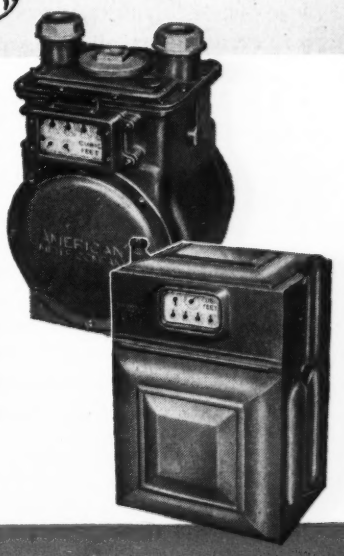

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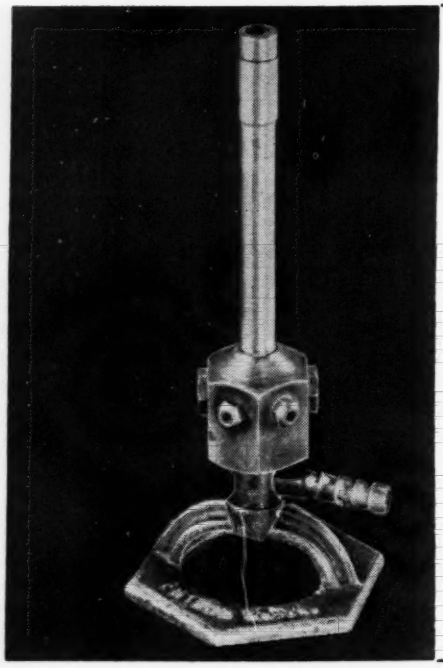

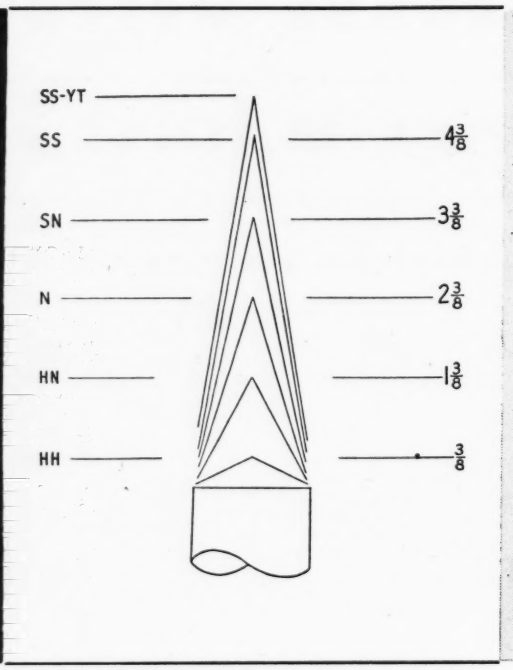

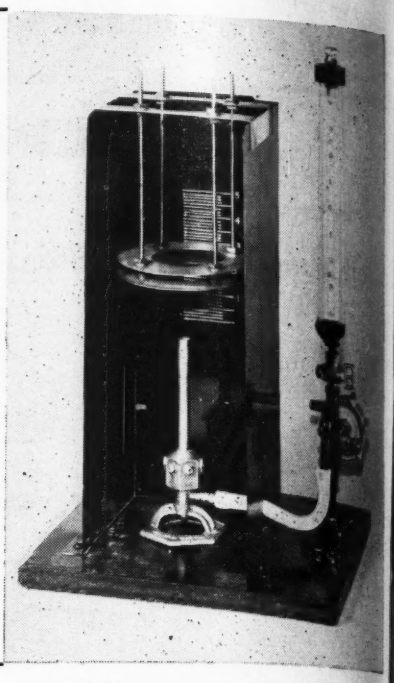

The flame height burner (left) is a bunsen type burner with a fixed gas orifice and gas port, and six fixed air ports. These ports can be changed by removing the orifice spuds and inserting other spuds with different drillings. The burner is calibrated to give a normal flame at 4.5-in. pressure (2⅜-in. inner cone height as it turned out) on the desired base gas. Our flame height burners were initially set on 530 Btu, 0.67 sp gr manufactured gas and successively recalibrated on our 650 Btu, 0.61 sp gr mixed gas and our present 700 Btu, 0.61 sp gr mixed gas. When this burner is used for interchangeability tests, the difference in the height of the inner cone for the base gas and the test gas represents the change in flame characteristics between the two gases.

This difference can be evaluated by using a chart similar to that shown. For example: if the base gas showed a 2⅜-in. flame height or normal flame and the test gas showed a 3⅜-in. flame height or soft-normal flame, the change would be one point in the soft direction and the gas would be considered the outside limit for interchangeability as far as flame characteristics were concerned.

The flame height burner set up for use as a control burner (right) is placed on an appropriate stand with a metal shield around three sides to prevent drafts. A scale is mounted on the back side of the shield for use in measuring the height of the inner cone. A short manifold with a shutoff cock, a gum filter and pressure gauge connection are mounted on the base of the stand along side of the shield and the burner is hose-connected to this manifold. The fast-to-slow burner ratio is controlled from this burner by frequent observations of the inner cone height by plant personnel, always making sure that the flame height is maintained within the predetermined limits.

tional two proposed by next winter. This increase is even greater than it appears when it is considered that, while it was possible to make producer-blue gas before natural gas was available, it was seldom if ever made because of capacity and the lack of adequate enrichment gases. Natural gas made it feasible to use producer-blue gas in addition to providing reformed natural gas, catalytic cracked natural gas, and modified natural gas for the total gas mixture. This meant that the gas supplied in Philadelphia changed practically overnight from a mixture of two gases (coke oven gas and carbureted water gas) to a possible mixture of seven gases. The construction of an L. P. gas tank farm and vaporizer added two more gases to the possible mixture (butane and modified butane) and the tentative plans call for the addition of two more gases by next winter (oil gas and catalytic cracked kerosene). The more gases that become available for use in making the final gas mixture, the more difficult and important becomes the problem of quality control.

Interchangeability tests of the various mixtures that might be used to provide the required sendouts clearly showed the importance of the fast-to-slow burner ratio and the hydrogen-to-inerts ratio on the quality of the final gas. The fast-to-slow burner ratio is the ratio of hydrogen and carbon monoxide to methane, ethane, and illuminants. An appreciable increase in this ratio would harden the flames on the customers' appliances with a tendency toward flashbacks, noises of extinction, and short pilot flames causing delayed ignition or the closing of the safety pilot valve. A definite decrease in this ratio would soften the flame with a tendency toward bad combustion and yellow tipping or a general overgassed condition. The hydrogen-to-inerts ratio is the ratio of hydrogen to carbon dioxide and nitrogen. A definite decrease in this ratio would tend toward a blowing condition on many burners.

Our experience during the first week or so of operating with natural gas indicated the necessity of controlling both the fast-to-slow burner ratio and the hydrogen-to-inerts ratio. While both of these ratios can be obtained from the chemical analysis of the final gas, the 24-hour sampling period and the several hours required for analyzing with our present analytical equipment mean that the gas is used long before the results are reported. This required the development of a method by which instantaneous determinations of these two ratios could be made. It was decided that two test setups developed for use during the extensive interchangeability tests conducted before the arrival of natural gas could be applied to the control of these ratios.

One of these test setups, the so-called Philadelphia test burner or flame height burner, had been developed to measure accurately any difference in flame height between a base gas and the test gas. This flame height was converted to flame

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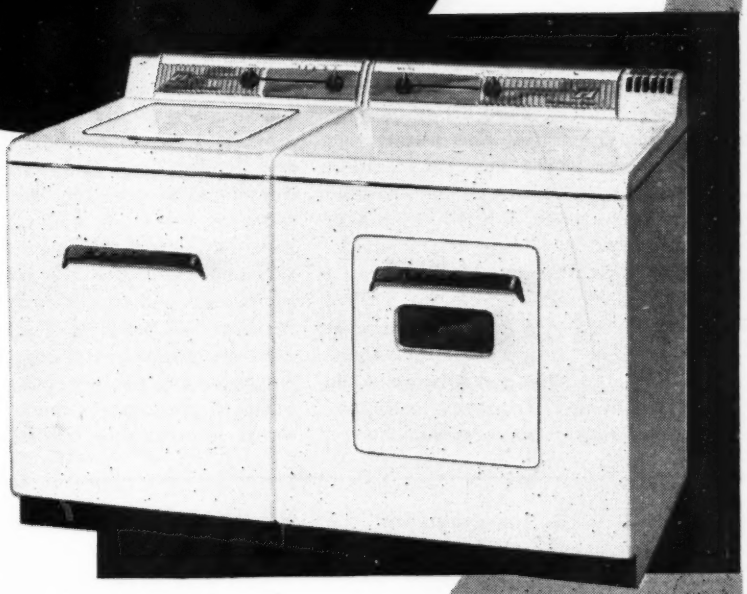

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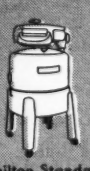

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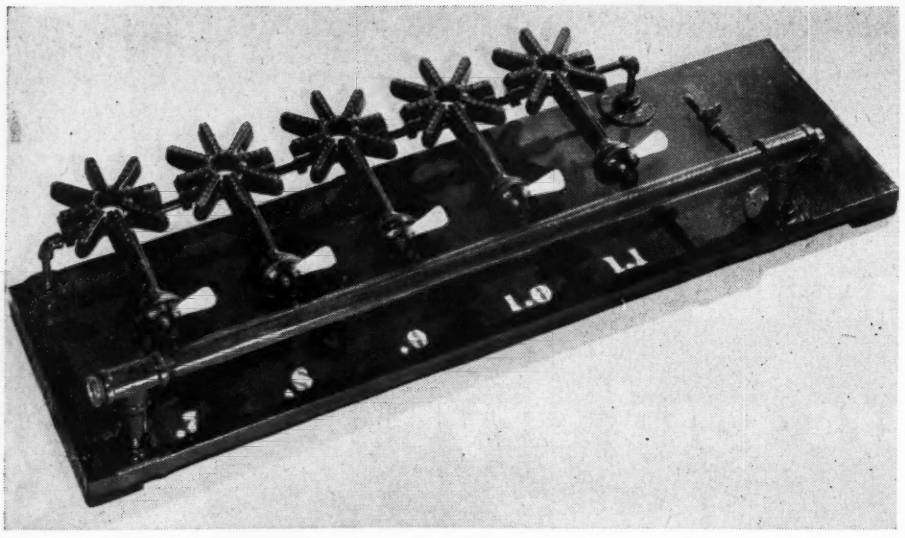

The hydrogen-to-inerts ratio test burner consists of five identical star burners (star burners being one of the more critical type of burners from a lifting standpoint) mounted on a common manifold. Each burner was set for the same gas input by using fixed orifices. The burners were adjusted on five different synthetic base gases with hydrogen-to-inerts ratios of 0.7, 0.8, 0.9, 1.0, and 1.1. The burners were numbered for their respective ratios and the air shutters were adjusted so that the flames would just begin to lift or blow on the particular ratio gas. This meant that the 1.1 burner would have the hardest flame characteristic and each burner would be progressively softer with the 0.7 burner having the softest flame characteristic. The adjustments were checked by burning one of the synthetic mixtures on all five burners and observing that each burner was in the proper sequence. The hydrogen-to-inerts ratio of any gas mixture could then be determined practically instantaneously by lighting the burners individually, starting with the 0.7 burner, and observing on which burner the flames were beginning to lift or blow. The ratio of the gas mixture would then correspond with the burner number or be slightly lower, depending on the degree of lifting or blowing.

For example, if the 0.7 burner were stable and the 0.8 burner showed several ports tending to lift, the ratio of the particular gas mixture would be between 0.75 and 0.8; and if the other three burners were lit, the 0.9 burner would show approximately 50% of the ports lifting and the 1.0 and 1.1 burners would lift or blow off completely. Observations of these five burners when operating on the gas being made by the plant would instantaneously show to what degree the ratio of the gas was above or below the established minimum ratio and thus indicate the changes necessary in the plant operations to produce the desired ratio gas. Continued observations of the burners would show the effect of any changes made and would indicate whether they had been too drastic.

characteristic terms for evaluating the degree of interchangeability of the test gas. This change in flame height, under standard operating conditions, is in effect caused by a change in the fast-to-slow burner ratio; so that while the flame height burner would not give actual values of the ratio, it could be used to control the changes in the ratio. The flame height burner was designed after an investigation showed that the various test burners in existence at that time were adjustable in one way or another, and as such were not considered suitable for our purpose, even though several of these burners had been satisfactorily used by others for interchangeability tests, we felt that our need was for a burner with all parts fixed.

Our present limits are 2½-in. minimum and 3-in. maximum. If the flame height should tend to approach or go below the minimum, compensating Btu's would have to be added to maintain the 2½-in. limit. On the other hand, if the flame height approached or went over the maximum, a suitable change in operation would have to be made to provide more fast burners or to increase the specific gravity in order to maintain the 3-in. limit. These limits are rather close and would seem to present an operating problem; however, our production department has had little or no difficulty in maintaining these limits during the last few years.

It is significant to note that during the last two winters (1950-51 and 1951-52), when it was necessary to make large quantities of water gas and consequently tend toward a harder flame with more fast burners, the rigid adherence to the 2½-in. minimum flame height virtually eliminated service calls due to flashbacks, noises of extinction, delayed ignition, and closing of the safety pilot valve that otherwise would have caused a considerable burden on the customers service department forces. The strict observance of these limits by the plants has given our customers a uniform gas, as far as flame characteristics are concerned, throughout the year and has enabled our servicemen to make their required daily adjustments on virtually the same gas each day.

A test setup for making instantaneous observations of the hydrogen-to-inerts ratio was developed after lifting troubles were encountered on certain critical appliances. These troubles clearly demonstrated the necessity of controlling the hydrogen-to-inerts ratio of the final gas mixture above a predetermined minimum, below which lifting difficulties could be expected. This minimum was initially established at 1.0, based on AGA information and laboratory tests, and later reduced to the present 0.9 minimum because of field experience. An instantaneous observation was required, as conceivably a low ratio gas could be put on the town, causing severe complaints and hazards, before the ratio was otherwise determined. It was established that burners could be adjusted on a gas mixture of the desired minimum ratio and that they would then indicate, by a change in flame stability, whether the ratio of another gas mixture was above or below this minimum. The production department, for economical reasons, desired to operate as close to the prescribed minimum ratio as possible; consequently, a setup had to be developed whereby the amount the ratio was above or below the minimum could be determined.

The two test setups have been successfully used in Philadelphia as a method of quality control since the arrival of natural gas in 1948. Identical sets of these control burners are in operation at each plant on holder inlet gas. Holder inlet gas was selected as the control medium in order that any gas not meeting the established requirements could be caught before the bad gas filled the plant holders and reached the customers' appliances. Any bad gas caught in the holder inlet line could be stored in one isolated holder until the proper quality gas was again obtained and then the bad gas could be bled out in small quantities with the regular quality gas.

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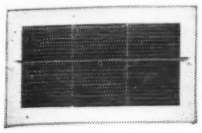

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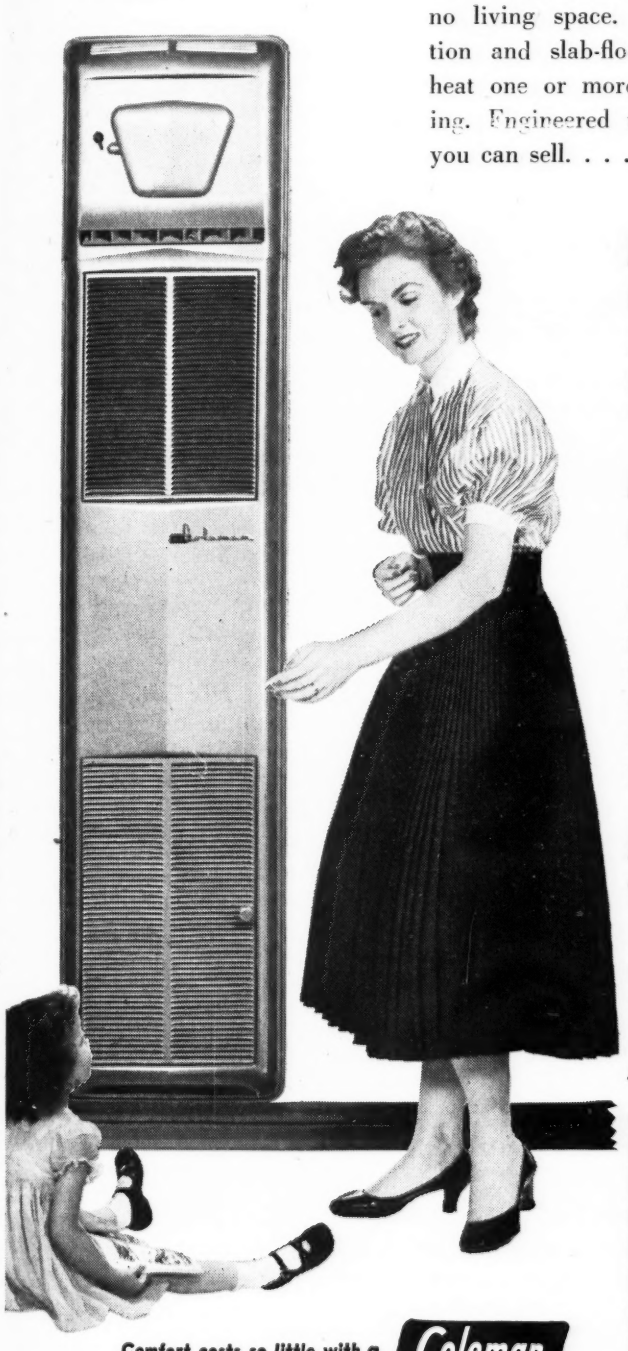

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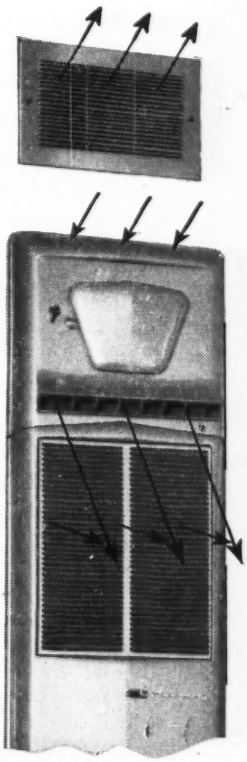

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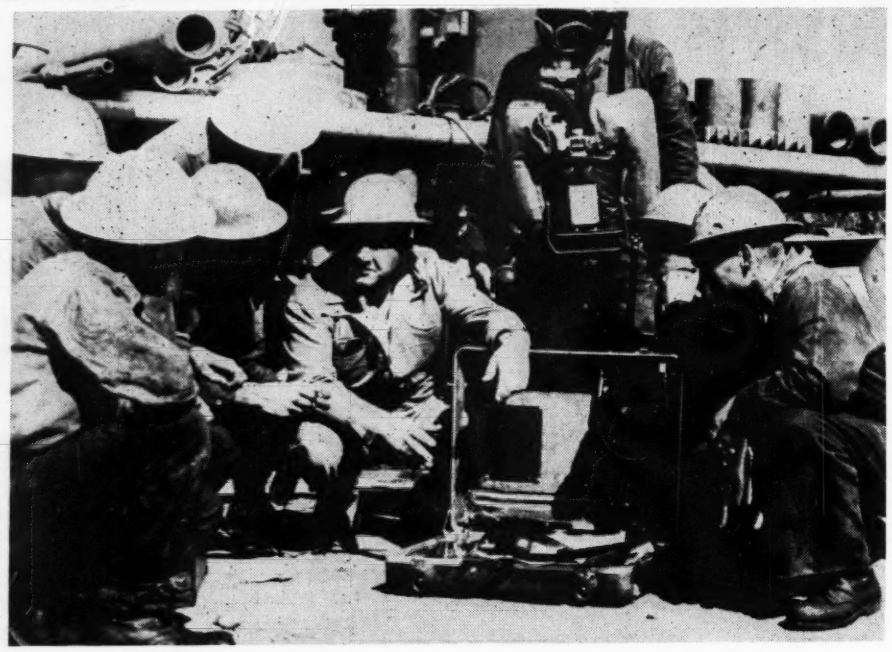
EQUIPMENT APPROVED BY AMERICAN GAS ASSOCIATION



In the foreground is the Pneolator, the artificial respiration instrument, in its carrying case. The worker in the rear is wearing the Chemox self-generating oxygen mask.

Equipment protects against toxic gases

At one of Shell Oil Co.'s Canadian drilling locations, an extremely high concentration of toxic hydrogen sulfide—35%—threatened the safety of employees, necessitating safety equipment designed to provide respiratory protection and answer the demands of the company's far-flung western Canadian operations.

To provide automatic artificial respiration for victims of asphyxia, an instrument which its manufacturer, Mine Safety Appliance Co., calls the "Pneolator," was installed. While manual artificial respiration must always be applied immediately, once this instrument is put to use, no manual assistance is required. It inflates the victim's lungs with the right amount of oxygen at the right pressure for his specific needs; then it permits exhalation by natural passive return of the patient's respiratory muscles and lungs; and finally it reinflates the lungs with positive pressure. This cycle is repeated continuously in proper rhythm until the patient starts to breathe for himself, when the instrument automatically becomes an inhalator to supply his oxygen demands. No suction which might harm delicate lung tissue is employed.

The instrument, complete with a 21-cu ft capacity oxygen cylinder, weighs only 47 lbs. Its compactness made it a natural in answering Shell's requirements for equipment which would be effective and still be light enough to allow easy transportation over difficult terrain.

The second instrument employed by Shell to insure its workers against being overcome by the toxic gases is the Chemox oxygen breathing apparatus. This, also, is a light and compact unit with a self-contained breathing circuit which operates independently of outside air. Worn like a gas mask, the Chemox utilizes a replaceable canister containing a chemical which, upon contact with the moisture in the wearer's exhaled breath, evolves a plentiful supply of oxygen for breathing requirements. At the same time, this chemical absorbs the exhaled carbon dioxide.

The Chemox is claimed to provide complete protection for its wearer in all oxygen-deficient or highly gaseous atmospheres for a minimum of 45 minutes. The canisters weigh only 4 lb and are easily stored in quantity at any job site. They, too, are quite easy to transport.

passing through a dead weight pressure regulator and a gum filter. The regulator is set to provide a constant operating pressure of 4.5 in. of water. The wet test meter is installed in the setup for two reasons; first, it provides a means for checking the consumption of the various burners and, second, it acts to saturate the rather dry holder inlet gas. A series of tests on the flame height burner indicated a difference in the flame height between a dry gas and a saturated gas. It was decided to operate the control burners on saturated gas due to the fact that the commercial gas in the customers' homes is saturated and the other control devices, such as the Thomas calorimeter and the Ranarex, saturate the gas in their operation. The flame height burner is kept burning continuously and the hydrogen-to-inerts ratio burners are lit as required, it being extremely important that these particular burners be cold in order to obtain the proper observations. The control burners are observed every 30 minutes by specified personnel in each plant and at more frequent intervals when changes in operating conditions are taking place. The observations are recorded in the daily plant reports and any irregularities are investigated by the assistant superintendents. The quality of the gas is thus maintained by producing a 700 Btu gas with a specific gravity between 0.59 and 0.64, a flame height between 2½ and 3 in., and a slight blow on the 0.9 hydrogen-to-inerts ratio burner. When any of these conditions are not met, changes must be made in the operating procedure to rectify the variation from the established standards.

The control burners were designed and calibrated by the appliance laboratory of the customers service department and are maintained under their jurisdiction. The burners are cleaned and checked every week by the laboratory. This weekly cleaning is essential in that a slight buildup of dust on the air shutters or ports will affect the flame characteristics and, in turn, the accuracy of the observations. The laboratory maintains additional sets of control burners in its building at each plant for use in checking constituent gases and test gases. The calibration of all the control burners is checked on synthetically prepared base gas every three or four months.

This method of calibrating and maintaining the control burners means that the customers service department is responsible for setting the standards for the quality of the gas produced, as far as flame characteristics and stability are concerned. It is our feeling that this responsibility rightfully belongs to the customers service department as it is their function to see that the customers' appliances perform properly.

The results obtained in Philadelphia since the establishment of the control burners, nearly five years ago, have been very satisfactory as far as reducing service calls and maintaining customer good will. We believe, from our experience to date, that quality control of fuel gases is an essential part of gas production, particularly where mixed gas is being distributed.

This article is adapted from a talk presented during the production and chemical conference, May 25-27, in New York.

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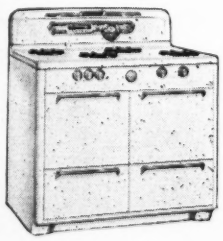

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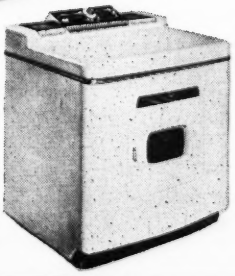

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"Electro-Osmosis"

. . . a new process for holding back ground water during excavation

WHAT Consumers Power Co. believes to be the first application in the Western Hemisphere of an engineering method that made the German underground U-boat pens possible during World War II—"electro-osmosis"—enabled the Jackson, Mich., utility to build an addition to its electric power plant at Essexville, near Bay City, Mich., right on the banks of the Saginaw river.

The method, whereby wet and shifting soils are stabilized to make very difficult—if not impossible—construction jobs relatively easy, was turned to the peacetime task of excavating for the foundations of a 135,000-kw plant to serve Consumers' 60-county outstate electric service area.

This is how *Consumers Power News* describes the operation:

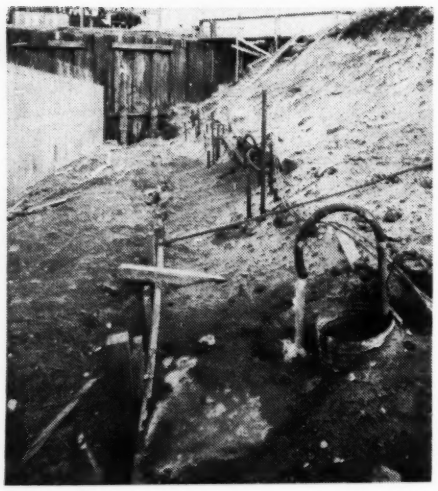
In the big excavation adjoining the Weadock plant, where foundations for a building to house a new 135,000-kw steam-electric generator will be installed, electro-osmosis is holding back soil which could otherwise pour into the excavation from the sides and push up from the excavation floor. The process takes the place of heavily braced sheeting, or walls, to hold the soil back.

In fact, a few feet from the great cavity and nearly 40 ft above the bottom of the excavation, the Saginaw river flows slowly by, and the great pressures it exerts on the temporary sheeting or coffer dam, holding one wall of the excavation, are rendered harmless by this new process.

Here is how it's done:

A series of steel rods (anodes) is driven in the ground around the excavation, forming an underground "fence." These are charged electrically, low-voltage direct current flowing steadily from these rods to a second series of heavy rods (cathodes). As the current flows, water is forced from the soil to the cathode pipes.

The electric current thus acts to dry out the soil surrounding the excavation through increasing its strength, and is a barrier to outside shifting soils.



Electrodes in line near new wall (left) of plant addition. Cathode in foreground has icicle formed by water being forced from subsoil under "voltage pressure" equivalent to 6000 lb/sq ft.

This process was developed after many years of study and experiments in Europe by Dr. Leo Casagrande, now of Harvard University, who has visited the Weadock plant several times to supervise his process at work. Dr. Casagrande's services, demanded by the Germans, made the Norway U-boat project possible.

Richard W. Loughney, Harvard graduate expert in soil mechanics, has been stationed at the plant for Griffin Wellpoint Corp. to oversee the electro-osmosis process, the process of "invisible walls."

Mr. Loughney explained that for the Weadock job, 50 pairs of anodes and cathodes were driven into the excavation perimeter just outside the foundation lines. The electrodes are about 10 ft apart.

The Weadock plant addition excavation, with Saginaw river at right separated from the deep hole by a coffer dam and the "invisible wall" of electricity—the electro-osmosis process at work. The water intake channel is the "hole in a hole" near the center of the excavation. Electrodes 10 ft apart were placed around both "holes." The hole at its deepest is 37 ft under the normal elevation of the river.

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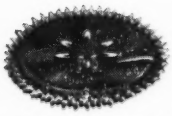

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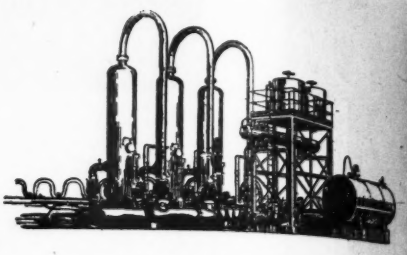
Should it be "and" or "or"?



Congress, Phillips move to upset court of appeal's "gathering" decision

A CHAIN reaction of events was set off last month as an aftermath of the May 22 decision of the District of Columbia court of appeals which overturned the FPC's 1951 decision in the Phillips Petroleum case. The commission's famous order, based on 10,000 pages of testimony, had declared that sales by Phillips, one of the nation's largest producers, were not subject to FPC jurisdiction.

It didn't take long after the court laid down its ruling for Phillips to file a notice of appeal to the Supreme Court, thus ending speculation as to which party—Phillips or FPC—would initiate the action. FPC was respondent in the appellate court proceedings which were brought by several states, municipalities, and other local governments.

Kerr-type bill

Representative Lyle of Texas wasted no time in pressing for early action on his Kerr-type bill to exempt producers from FPC rule. He said he saw no point in waiting for a Supreme Court decision so long as uncertainty exists.

Down at Dumas, in the Texas Panhandle region, farmers who have been receiving natural gas from Phillips at extremely cheap rates to operate irrigation wells were reportedly "stunned" when Phillips announced it could no longer provide the service as it was risking being classified as a utility company.

The majority decision, written by Judge Edgerton and concurred in by Judge Prettyman, turned on the "generic question of whether the exemption of 'production and gathering' in Sec. 1 (b) of the Natural Gas Act covers interstate sales of gas by the corporation that produced and gathered it." Said the majority: "We think the commission has applied an erroneous rule of law. Phillips' sales to the pipeline companies are not within either the statutory phrase 'the production or gathering of natural gas' or the Supreme Court's paraphrase 'made during the course of production and gathering.'"

GAS staff report

False assumption?

Judge Clark, dissenting, held that his fellows "simply assume that 'Phillips sells this gas after the time and beyond the place at which production and gathering are complete . . .' and then go on to build on that assumption of the answer elaborate and imposing arguments leading quite naturally to the final conclusion that Phillips' sales are indeed without the exemption of 1(b)."

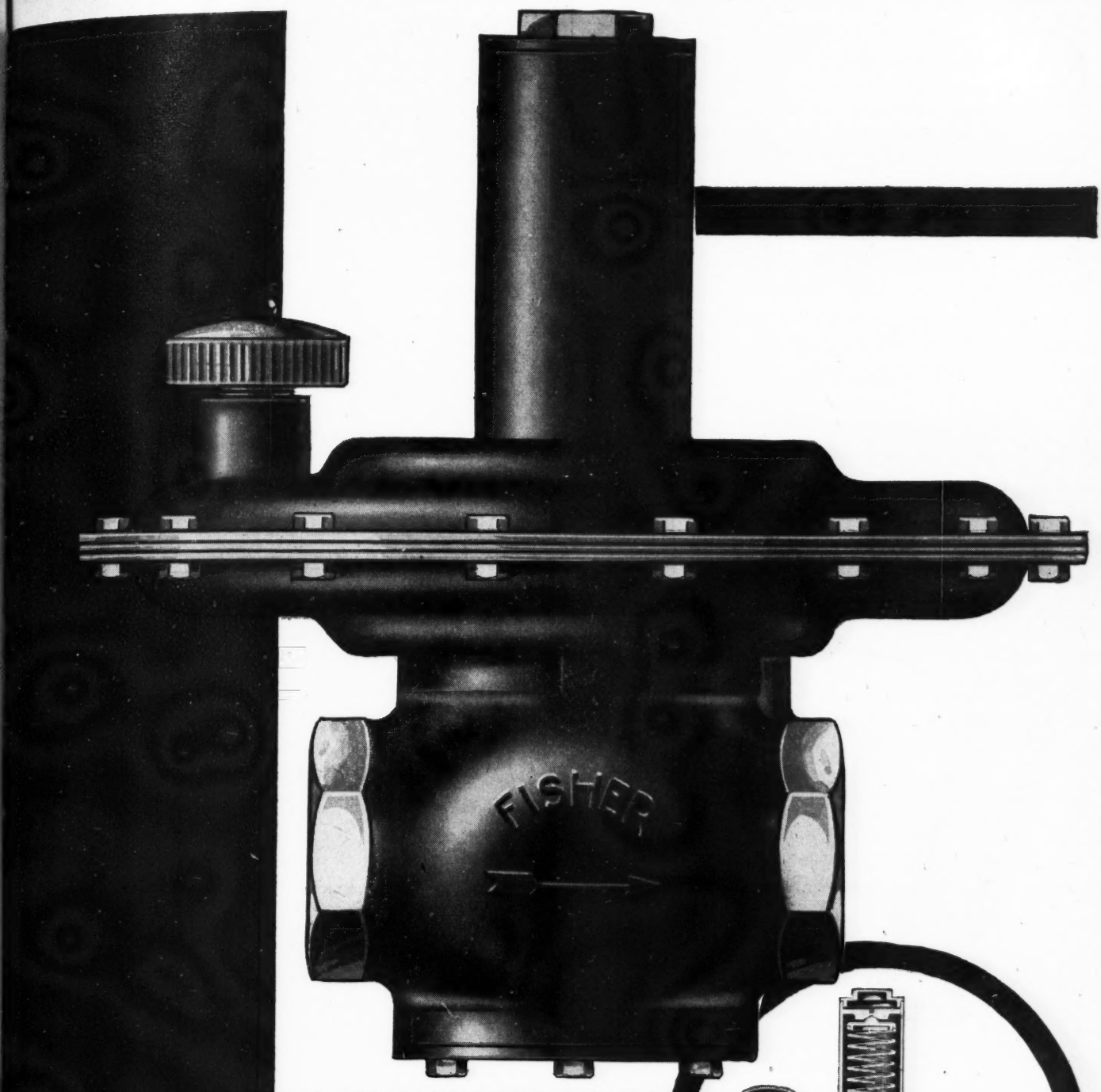
The majority opinion traced the history of federal actions that culminated in the passage of the Natural Gas Act, and stressed what Judge Clark referred to as the "famous gap" in regulatory authority as the basis for conceding FPC's authority. The majority noted that "some years" following a declaration by the Supreme Court in 1924 that the Constitution forbids states to regulate rates at which natural gas is sold, "at points remote from the wells, 'in wholesale quantities, not to consumers, but for resale to consumers in numerous cities and communities in different states,' . . . Congress decided that that particular commerce should no longer be free from regulation and therefore passed the Natural Gas Act of 1938."

In its report on the then pending bill, the House Committee on Interstate and Foreign Commerce said (the court cited), "'Sales for resale, or so-called wholesale sales, in interstate commerce (for example, sales by producing companies to distribution companies) . . . have been considered to be not local in character and, even in the absence of Congressional action, not subject to state regulation . . . The basic purpose of the present legislation is to occupy this field in which the Supreme Court has held that the states may not act.'"

Retorted Judge Clark: "The majority attempts to justify its conclusions with the argument that the legislative history shows that this statute was enacted in order to close the 'gap' between federal and state regulation and that the commission order frustrates that purpose. But it is by no means clear that there was a gap where the majority thinks it was. The cases cited by the House committee . . . in support of the statement that the statute was designed to occupy a field in which the Supreme Court had held that the states cannot act . . . dealt with sales *after* transportation in interstate commerce and were related to transportation and distribution, not transportation and gathering."

The Interstate Case

The majority laid heavy emphasis on the Supreme Court's decision in the Interstate Natural Gas Case (1947). In that case, the high court had said, "it was not the purpose of Congress to free companies such as petitioner from effective public control. The purpose of the restriction was, rather, to preserve in the states powers of regulation in areas in which the states are constitutionally competent to act." In that case, said the majority, "the Supreme Court found the commission's rate regulation not within the intent of the 'production and gathering' exemption because not inconsistent with exercise by the state of its regu-



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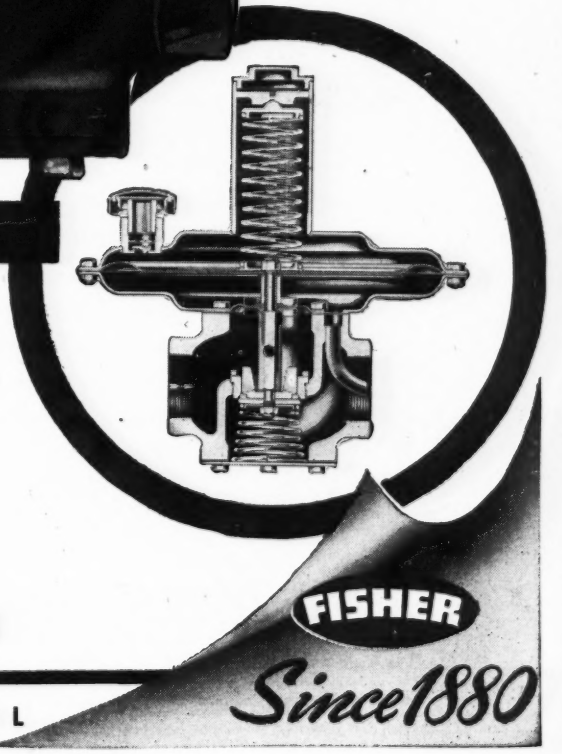

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latory functions. This made it unnecessary for the court to decide 'whether the gathering process continued to the point of sale' although it observed that 'by the time the sales are consummated, nothing further in the gathering process remains to be done.'"

Sales or well spacing?

"But in the decision that the Supreme Court affirmed," said Judge Edgerton, "the court of appeals . . . following the Colorado Interstate case . . . expressly rejected Interstate's attempt to 'read the exception with respect to production or gathering as an exception with respect to sales.'" In this connection, the majority quoted the Colorado Interstate decision of the Supreme Court, which said that "It is plain the commission has authority to fix its wholesale rates . . . That does not mean that the part of 1(b) which provides that the act shall not apply 'to the production and gathering of natural gas' is given no meaning. Certainly that provision precludes the commission from any control over the activity of producing or gathering natural gas. For example, it makes it plain that the commission has no control over the drilling and spacing of wells and the like."

Judge Clark's reply:

"Nothing could be more absurd than to say that production and gathering are exempt but that the final sale by the producer and gatherer is subject to the act. That line of reasoning reduces the exempion to a hollow shell without content or meaning."

Sales' the thing

The sale, said Judge Clark, "is the expected and necessary economic reward for the service performed. All three phases (transportation, production, and distribution) culminate in sales."

Another point of dissension revolved around semantics and the legal differences between the words "and" and "or." The commission, in deciding it was without jurisdiction, had noted that Phillips' transportation in interstate commerce and its sales in interstate commerce, together with its processing operations, "all constitute a part of its gathering business, *or* they are incidents of *or* activities related to such business, *so that* such movement, processing, and sales come within the exemption of production and gathering in Section 1(b) of the Act." The court held that "the premise does not support the conclusion.

"And/or"

"The Supreme Court said in the Interstate Natural Gas case: *'where sales,* though technically consummated in interstate commerce, *are made during the course* of production and gathering *and* are so closely connected with the local incidents of that process as to render rate regulation by the Federal Power Commission inconsistent or a substantial interference with the exercise by the state of its regulatory functions, the jurisdiction of the Federal Power Commission does not attach.' By replacing the Supreme Court 'and' with 'or' reverses the sense."

To which Justice Clark replied, "Suffice it to say I cannot agree with the fine-spun reasoning of the majority which purports to find an 'and' where the commission found an 'or' . . . The act can hardly be read to require that sales, to be exempt, be not only made during gathering but also related thereto."

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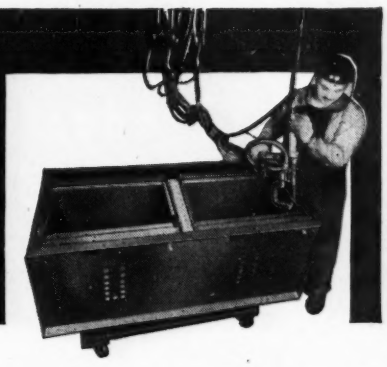

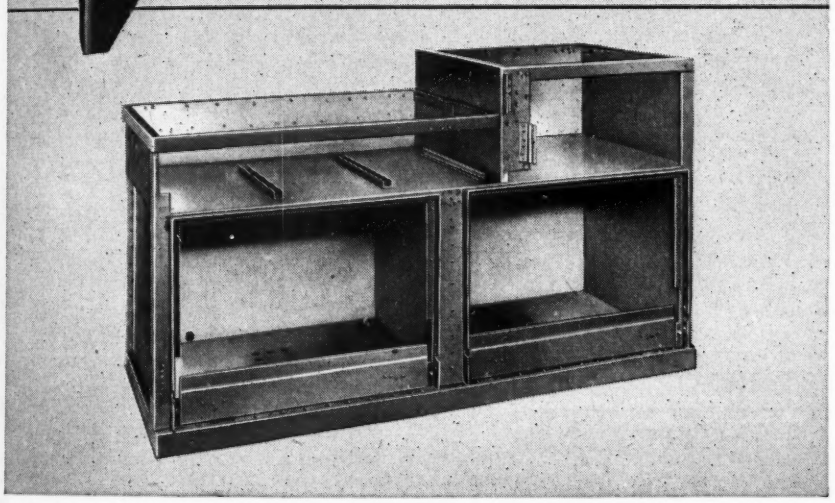

Means Even Greater Strength, Makes Sagging Impossible in Famous Restaurant Range Line!

It's another first by Garland. Another step which makes the Garland line even more modern, super-sturdy, and even more appealing to your restaurant range customers. New Garland all-weld construction is standard on all restaurant models.

All-weld construction is a new precision method of welding the entire range body. This is a process comparable to that which gives such great strength and durability to aircraft and automobiles.

You can promise your customers maximum efficiency . . . steady, even, easily-controlled temperatures with a Garland. You can promise them maximum utility . . . broiling, baking, roasting, griddle frying all at one time if need be. You can promise them a range that gives the greatest dependability and length of service known to the industry.

Available in standard black-Japan finish, new Garland granite gray, or stainless steel. Write for full line information.

You're in Business But Good . . . with the Garland line!

COMMERCIAL
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DM PRODUCTS

Heavy Duty Ranges • Restaurant Ranges • Broiler-Roasters • Deep Fat Fryers
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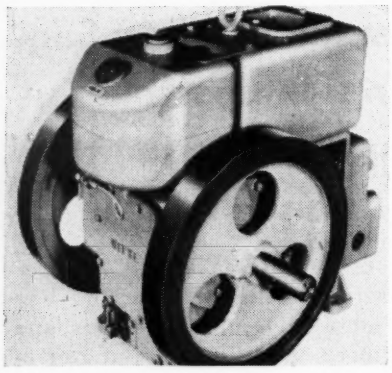
DETROIT-MICHIGAN STOVE COMPANY, DETROIT 31, MICHIGAN

New Products and Trade Literature

To secure further information on products or new literature, simply fill out the coupon and mail, indicating by number the information or literature needed.



1 Engine

The Witte Model 98 engine can operate on natural or bottled gas, gasoline, or kerosene and is designed for intermittent and continuous operation. It is a single-cylinder, horizontal, 4-cycle, water-cooled engine available with tank, hopper, or condenser cooling systems.

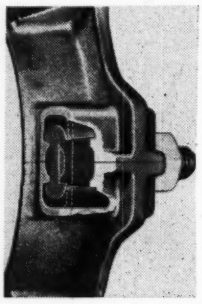
A "square" engine (5-in. bore by 5-in. stroke), the 98 develops from 5 to 10 hp and has a medium speed range of from 500 to 1200 rpm. For continuous 24-hr operation at 1200 rpm, it is rated at 8.28 hp on gas fuels with condenser cooling system, or 9.2 hp with hopper or tank cooling. The starting crank is built into the flywheel, and disappears into the flywheel when the engine starts.

The engine is designed with a removable, wet cylinder liner and with tapered roller main bearings. It has an aluminum piston and a dynamically balanced crankshaft with integral counterweights. Replaceable valve-seat inserts are provided for both exhaust and intake valves.

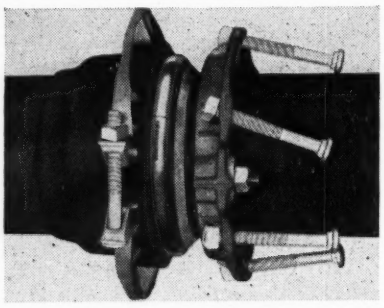
Witte Engine Works, Oil Well Supply Div.

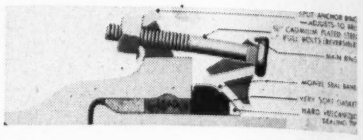
■

2 Bell Clamp Joint



Among recent improvements incorporated in the Skinner-seal bell clamp joint is the almost horizontal position of the massive ¾-in. pull bolts. The anchor ring on the larger sizes has also been changed to make installation easier and quicker and a new cone lock (see inset) has been used on the 14-in. and 18-in. through 42-in. sizes.



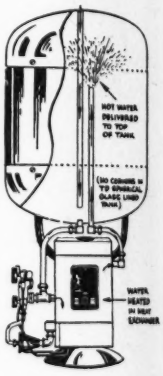


The sectional photo shows how the gasket is sealed (1) at the bell face by a monel metal band and (2) at the pipe by hard vulcanized gasket tip acting as a plug. The other photo shows the clamp with the main ring drawn back.

M. B. Skinner Co.

■

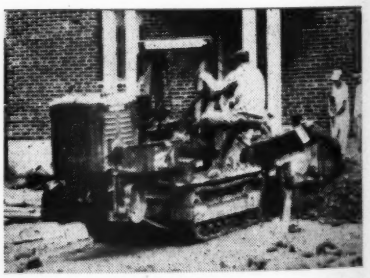
3 Water Heater



A new glass-lined hot water heater, the "TD," has been introduced by Downs Manufacturing Co. The water heater, first of a line, has a spherical glass-lined tank with no corners. The manufacturer claims that hot spots cannot occur in the TD because the products of combustion never come in contact with the tank, which is separate from the heat exchanger. It is in the heat exchanger that the water is heated.

Downs Engineering Co.

■



4 Digger

An easy-shifting, four-speed motor transmission that doubles the number of digging wheel and traction speeds is now part of the Cleveland Model 92 Baby Digger.

For each of the new transmission's four

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GAS, 198 S. Alvarado St., Los Angeles 57, Calif.

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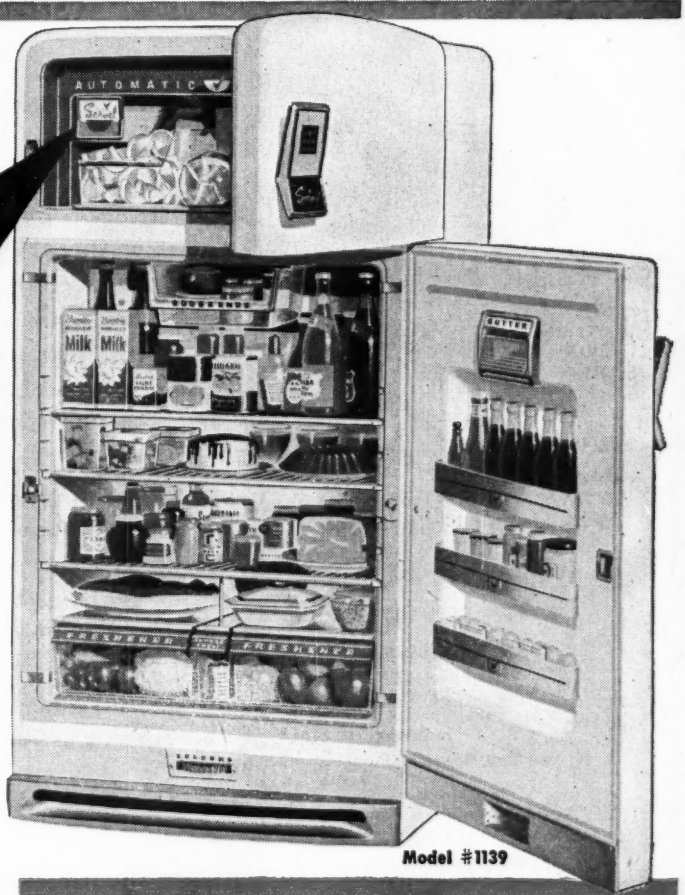
THE NEW SERVEL...BEST WAY TO...

INCREASE SUMMER GAS LOAD!

Makes Ice Cubes Without Trays...
and puts 'em in a basket-
AUTOMATICALLY



Model #1139

Servel

AUTOMATIC ICE-MAKER REFRIGERATORS

The name Servel means GAS to millions! And today millions are talking about Servel—the miracle refrigerator that makes ice cubes without trays—automatically. People are crowding appliance showrooms everywhere to watch in wonder the industry's most dramatic refrigerator demonstration. Servel has created sales excitement never before known in refrigerator selling.

And what's more...Servel with its automatic ice making feature is important in building year 'round gas load... especially during the summer...when a Servel actually increases household gas consumption.

SERVEL The name to watch for great advances in **REFRIGERATION and AIR CONDITIONING**

Servel Inc., Evansville 20, Indiana
In Canada, Servel (Canada) Ltd., 548 King St. W., Toronto, Ontario

SERVEL'S PROOF OF SUPERIORITY
CAMPAIGN is Underway!

Tie in with the promotion designed to really move refrigerators for you! Call your Servel distributor today... for genuine refrigerator sales action!

wheel speeds (four forward, one reverse), there are 12 crawler speeds. The 48 speed combinations developed provide 30 or more smoothly balanced, usable digging speed combinations ranging from .45 to 34.6 fpm. The transmission is completely contained in a welded steel, oil-tight housing and is equipped with anti-friction bearings.

Cleveland Trencher Co.

■

5 Powerpile

A blue flame pilot that uses no primary air is the outstanding feature of Minneapolis-Honeywell's new CS82 Powerpile. Air is inspirated only at the point of combustion rather than at the pilot burner orifice. The CS82 utilizes a common thermopile-pilot flame to supply operating current for the system and ignite the main burner.

In addition to the universal burner tip, the standard pilot-burner orifice may be used for all gases. The flexible inlet tube, plus the two mounting brackets furnished, simplify connecting, mounting, and locating the Powerpile unit.

The new Honeywell Y-400 Powerpile thermostat-valve package is also available. Incorporated is the VS-87, an electric-actuated diaphragm gas valve featuring a self-contained, polarized relay which utilizes a permanent magnet to amplify the power furnished by the Powerpile unit.

Minneapolis-Honeywell Regulator Co.

■

6 Air Conditioner

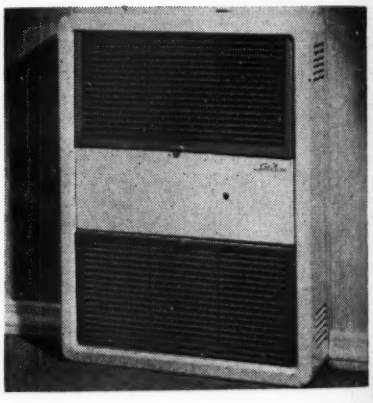
Cooling and moisture control for summer comfort are combined with both gas and oil-burning Blend-Air furnaces in the new Coleman year-round air conditioning system.

The air-handling system includes factory fabricated ducts only 3½ in. in diameter and air blenders that give each room its own air circulation system. For water conservation, an evaporative condenser uses less than 6 gals. of water an hour for a 2-ton installation.

Cooling units are offered in 2, 3, and 5-ton capacities and in two different types of packaged systems. In one, the cooling section is mounted above the furnace and the evaporative condenser and compressor unit may be installed outside the house. The other type is a side-by-side installation of furnace and a self-contained cooling unit.

Coleman Co.

■



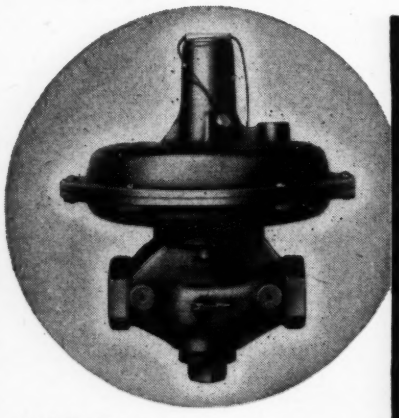
7 Wall Heater

The redesigned line of Stewart-Warner Saf-Aire Safety-Sealed wall heaters has been supplemented with a new 30,000 Btu per hr input model. Modernistic, neutral two-tone room panel is featured.

The Safety-Sealed line also features 14,000 (pictured) and 20,000 Btu models. With the Safety-Sealed principle gas fuel is burned within a sealed chamber that is vented through the wall to a windproof and stormproof patented Lundstrum vent on the outside. The design separates both fire and products of combustion from the air breathed

Steady

REYNOLDS LOW PRESSURE REGULATORS



PIPE SIZES:
¼" to 8"
¼" to 3" with screw connections
3" to 8" with flange connections

REPRESENTATIVES:

H. D. "Mike" Meuffels
423 Dwight Building
Kansas City, Missouri

Seidenglanz & Co.
2nd Unit, Santa Fe Building
Dallas, Texas

Eastern Appliance Company
281 Vassar Street
Cambridge, Massachusetts

Waldo S. Hull
258 Lee Circle
Bryn Mawr, Pennsylvania

Reynolds Low Pressure Regulators guarantee steady, constant, unvarying outlet pressure even though the volume varies and inlet pressure fluctuates. Precision built and delicately balanced for accurate performance on low pressure installations, the units illustrated are backed by factory tests over a wide range of operating conditions. Reynolds Low Pressure Regulators are economical and safe. Our Engineering Department is at your service.

GAS CONTROL Since 1892

Reynolds Gas Regulator Co.
ANDERSON, INDIANA, U. S. A.

GAS CONTROL SINCE 1892

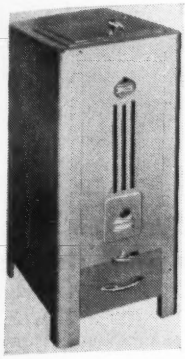
within the room. Air for combustion is taken from the outside.

In installation, each unit will fit between the studs in any home. In a rough-incut in the wall, an insulated rough-in box, air case, and pre-assembled heating unit are attached.

Stewart-Warner Corp.

■

8 Incinerator



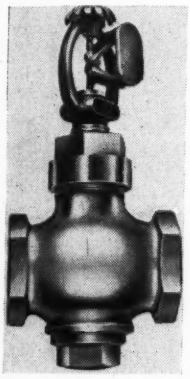
The Coronator is a gas-fired rubbish and garbage disposal unit introduced by Coroaire Heater Corp. Featuring a two-stage burner (2000 and 3000 Btu), the Coronator may be installed in kitchen, utility room or basement.

The interior compartment of the disposal unit is made of extra heavy fire-resistant steel. Operation is completely automatic and there are no moving parts.

Coroaire Heater Corp.

■

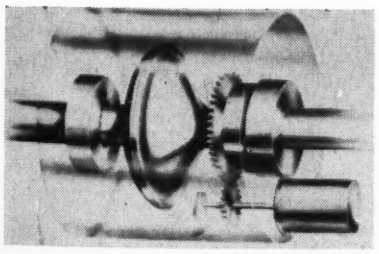
9 Shutoff Valve



Designed to be particularly effective in checking fuel-fed fires, a new automatic shutoff valve has been introduced by Valco Inc. The Valco valve is a quick-closing type that is normally held in an open position by an actuating head that operates like a standard sprinkler head. At the specified temperature, the head opens and releases tension on a heavy stainless steel spring, which closes the valve. In case debris or a blast knocks off the head, the valve will immediately close to prevent fire or secondary explosions.

Valco Inc.

■



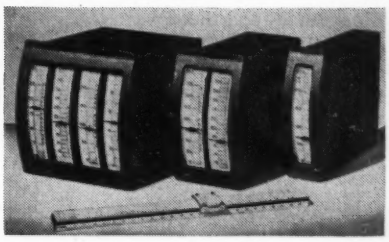
10 Flowmeter

Capability of measuring the true mass rate of flow of anything that will flow or fall through a pipe is claimed by Control Engineering Corp. for its new flowmeter. The mass meter responds to pounds and is insensitive to volume.

Direct reading measurements in terms of pounds per minute, or with integration pounds, can be made on gases, liquids, slurries, or particles in an air stream.

In industrial applications, two or more units could be used with a proportioning unit to control any mixture in an industrial process. In operation, measurement is made of the torque necessary to give the flowing mass a Coriolis acceleration. This torque is dependent only on the dimensions of the flowmeter, a rotational speed, and the mass flow.

Control Engineering Corp.

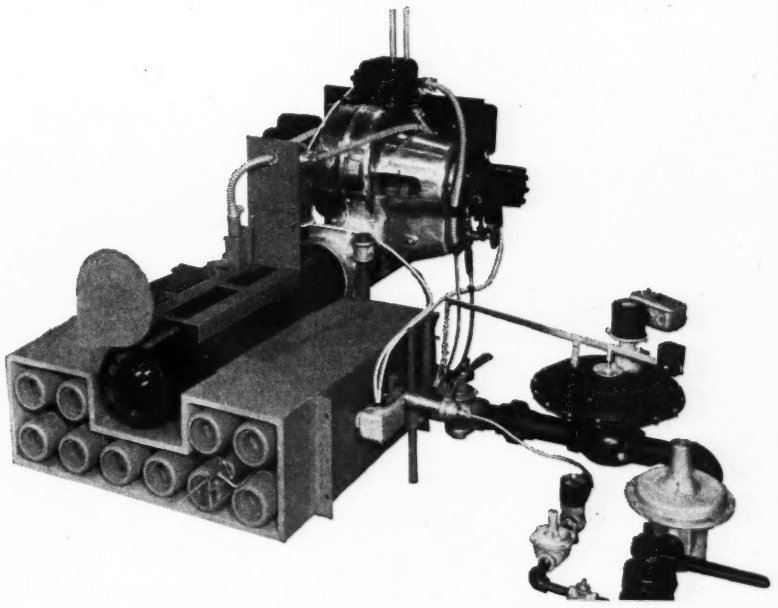


11 Indicating Instruments

Specially designed for panel mounting, a new series of vertical scale indicating instruments can be used on graphic or process control panel boards as receivers and as direct

WEBSTER DUONETIC*

for Dual Fuel Firing



The WEBSTER DUONETIC* now offers unsurpassed economy, efficiency and trouble-free operation in the combination oil and gas firing equipment field. Never before have both fuels been burned so well so simply.

You can rely on the usual WEBSTER quality to provide you with the best.

Both burners employ electric ignition, constant electric ignition on the oil burner, and electric ignition for the gas burner safety pilot.

*TRADEMARK

The WEBSTER ENGINEERING COMPANY

TULSA, OKLAHOMA

Division of SURFACE COMBUSTION CORPORATION, Toledo, Ohio

reading gauges and thermometers.

All units in the Mindicator line are in 4-in. scale. They require panel openings of 5⅜ x 1½ in. for single units and 1⅜ in. additional width for each unit added to a multiple housing.

Mindicators designed as receivers operate on transmitted pressure of 3 to 15 psig, using individually calibrated metallic bellows measuring elements. Direct reading Mindicator thermometers are available in any required scale range from as low as —200° to as high as 1000° F. Direct reading pressure gauges are available in scale arrangements from 0 to 10 psig to 0 to 1000 psig.

Dickson Co.

Trade Literature

12 Depository Bulletin

A new bulletin describes the Cramer "Dropository," an all-hour depository which has been designed to meet the increasing demand of the public for a means of making deposits or payments at all hours and on holidays. Installed through plate glass windows or masonry walls, with a chute to the receiving safe inside, the depository box can be adapted to virtually any conditions or desired arrangements. An envelope dispenser is also available with the depository in which envelopes are available for customer's use.

Cramer Safe Co.

■

13 Power Folder

Standby power for communications systems is described in a new two-color folder just issued by D. W. Onan & Sons. Descriptions and illustrations of Onan portable, mobile, and standby electric generating plants, as well as automatic line transfer controls, are given in the folder.

D. W. Onan & Sons Inc.

■

14 Burner Bulletin

Selas spear flame burners in five sizes are described in a new bulletin. Full-size illustrations of the burners and the flame length produced by them, together with Btu capacity, port area, and full dimensions, are included.

Selas Corp. of America

■

15 Tamper Catalog

Triplex tampers are described in a new four-page catalog published by Gunderson-Taylor Machinery Co. Specifications and applications, together with illustrations of the backfill tampers, are included.

Gunderson-Taylor Machinery Co.

■

16 Analyzer Folder

A new six-page folder from Arnold O. Beckman Inc. describes and illustrates all models of oxygen analyzers manufactured by the company. Principles of operation, features, characteristics, types, and applications are covered.

Arnold O. Beckman Inc.

■

17 Honeywell Catalogs

(When ordering any of the Minneapolis-Honeywell catalogs listed below, use the letter preceding the description together with the number of the notice.)

(a) Specifications, dimensional drawings, application data, and ordering information are included in Catalog 8305 describing non-indicating electric, electronic and pneumatic controllers for temperature, pressure and humidity, and pneumatic and electric valves, switches and relays.

(b) Specification Sheet 285 describes Brown pneumatic receivers, giving construction and engineering details.

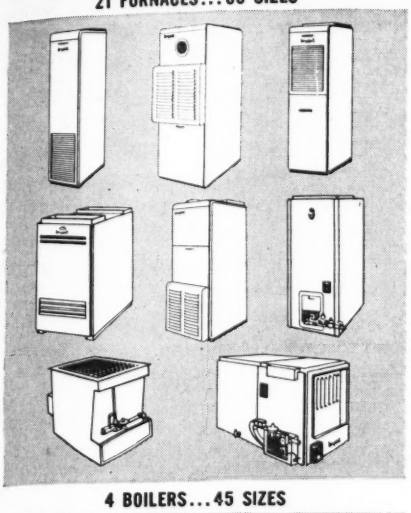
(c) Pneumatic butterfly control valves designed to regulate the flow of gas, air, liquids or steam in conjunction with indicating, recording or non-indicating pneumatic controls are described in Bulletin 8503.

Minneapolis-Honeywell Regulator Co.

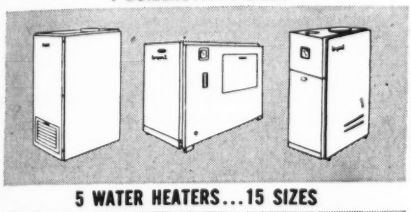
It takes a FULL team
. . . whether it's mountain climbers
. . . or digging equipment
1. This is for big jobs
2. This is for medium jobs
3. Sherman for all other jobs
On many excavating jobs the use of big equipment is costly and time-consuming. The Sherman Power Digger is designed so that you get all the advantages of power digging on these jobs. Thousands of users have proved that the Sherman Power Digger reduces costs. Write today for descriptive literature J.5.
Designed, Engineered and Manufactured Jointly by
SHERMAN PRODUCTS, Inc.
Royal Oak, Michigan
WAIN-ROY CORPORATION
Hubbardston, Mass.
Patent No. 2,303,825
Other patents pending
Sherman
PRODUCTS, INC.
ROYAL OAK, MICHIGAN

THE MOST COMPLETE LINE OF HOME CONDITIONING EQUIPMENT IN THE INDUSTRY

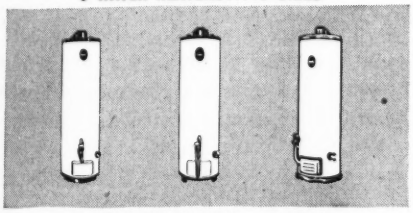
21 FURNACES... 83 SIZES



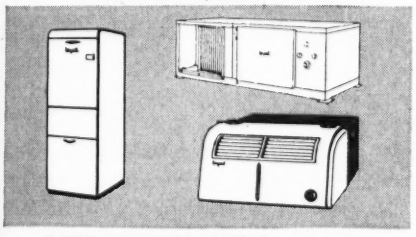
4 BOILERS... 45 SIZES



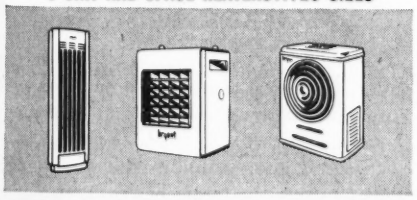
5 WATER HEATERS... 15 SIZES



3 AIR CONDITIONERS... 7 SIZES



6 UNIT AND SPACE HEATERS... 25 SIZES



bryant®

HEATING · AIR CONDITIONING · WATER HEATING

Thermally Thinking

Continued from page 22

Shore's supplier, Tennessee Gas, in case a TGT rate increase proposal now pending should be reduced or refused by FPC, would be passed along to Lake Shore's customers.

One case in which the Federal Power Commission seems to be moving faster than the applying company (or intervenors) desire is in the Panhandle Eastern Pipe Line Co.'s $21.4 million rate increase proposal, which was first requested in September 1951, and went into effect under bond in February 1952, some 17 months ago.

The FPC said it will omit intermediate decision in the case and will move to make a decision. The reason given for FPC's action was that Panhandle's customers are entitled to an early disposition of the proceedings so that they may plan their operations based on the ultimate determination of the case. In this connection, the commission said that the Natural Gas Act provides that it shall give preference to the hearing and decision of rate questions over other questions pending before it "and decide the same as speedily as possible." This sounded rather odd, considering FPC's recent history of delay on many rate cases.

Both Panhandle and Michigan Gas Storage Co., an intervenor, opposed the FPC's desire to omit the intermediate consideration.

The major and the minor

The Federal Power Commission has modified its proposed rule on the type of information to be considered in future natural gas rate case increases, and the principal feature of the modified rule is the distinction between "major" and "minor" increases to be considered by the agency. The rule was first suggested last October, and drew some objections in December from both attorneys and high officials of the natural gas industry.

A "major" rate increase under the new rule, requires a full statement of "test year" information as to previous actual sales and expense experience of the applicant, as well as data on the "cost of capital," including earnings-price ratios and other security market information on common stock sales for the previous five years. On the other hand, applicants for "minor" rate increases need file only statements showing balance sheet, income, and justification for the particular rate changes proposed.

The difference between a major and a minor rate increase application is about like this: A major rate increase would be a case in which the proposed change would be to boost general revenue (to obtain a fair return) or to raise rates to all customers served, or to increase rates in connection with greater volumes of gas to be delivered. A minor rate increase would be designed to bring the rate structure into balance, instead of increasing the general revenues. In cases in which a gas utility already has filed the necessary rate case data for a major increase, and finds it necessary to seek another increase within a year (in order to offset an increase in its own cost of purchased gas), it may treat the second increase as a minor application.

Some other important modifications in the original FPC rate case procedure rule also were adopted:

1. The FPC reserves to itself a certain degree of latitude in allowing a "reasonable deviation from the prescribed test period" in the submission of data covering sales expense, etc., including adjustments for non-recurring items.

2. Estimates of developments known to be in prospect—e. g., estimated income tax payments—do not seem to be precluded in the original proposed procedural rule.

3. The new rule apparently does not limit the submission of rate case information to the material specified in the regulation. The apparent purpose of the new rule is to aid the commission in disposing of such cases more promptly.

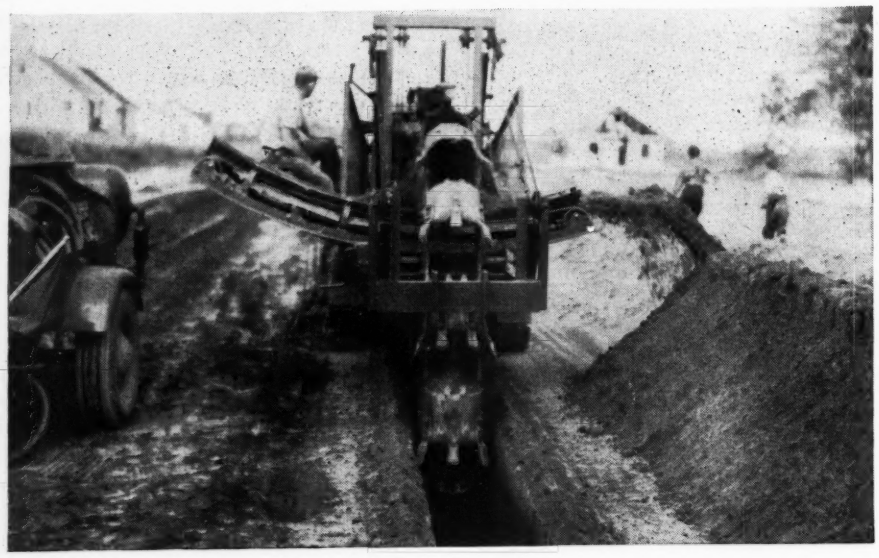
Over the top (barely)

New gas househeating installations during the 1952-53 heating season throughout the nation topped preseason estimates by a squeaky 11,000,

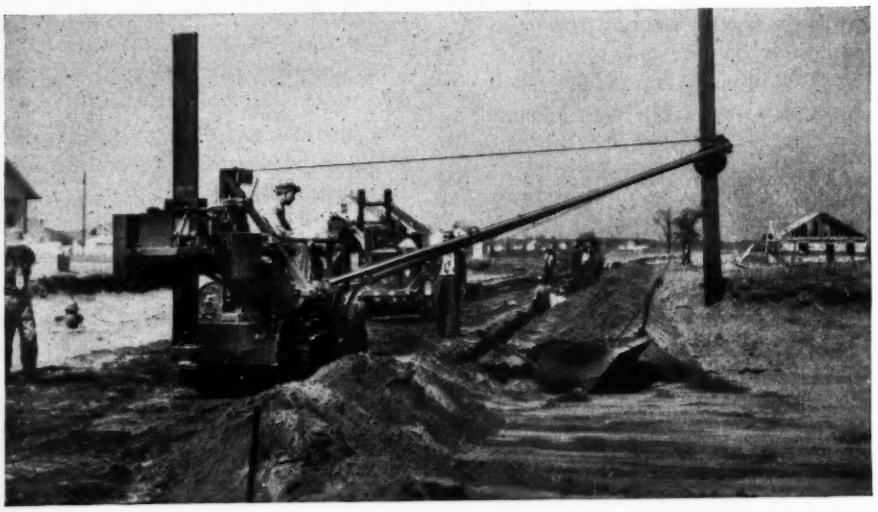
For fast and efficient production

CLEVELANDS Team-Up

on this gas main extension



The Cleveland "Baby Digger" Model 95, owned by the Minneapolis Gas Company, is making short work of cutting trench for a main extension under good digging conditions. Even greater savings were effected by the 95 during severe winter digging conditions.



Here, the same company's Cleveland Model 80 is speedily and cleanly backfilling the trench shown in the top picture. The 80 is also an excellent pipe layer. When job conditions require backfill compaction, the 80 does an outstanding job with no additional men or equipment necessary.

The
CLEVELAND TRENCHER CO.
Pioneer of the Modern Trencher
20100 ST. CLAIR AVENUE • CLEVELAND 17, OHIO

says AGA. Performance figures were 1,090,000, compared with the 1,079,000 predicted before the season began. However, the year didn't look so good when compared with the 1951-52 season, which saw 1,514,000 installations made.

AGA blames much of the drop on regulatory restrictions.

Best news in the entire situation is that saturation has climbed, nationwide, to 11,728,000, the equivalent of 48% of all residential customers. A year ago, the rating was 44.7%. Furthermore, the road ahead looks bright to most utilitymen, who see the year just passed as a low point with 1953-54 hitting 1,221,000 and the following two seasons rounding out at about 1.2 million each.

Based on reports from companies serving 22.7 million customers, the statistics are as reliable as they are heartening—or probably more so.

Here comes ignition report

Hardly a man is now alive (it seems as if) who can remember when AGA started its automatic range ignition field tests, but actually it's been *only* 34 months. As of the last report, 48 participating utilities had made 6860 monthly, 1193 special, and 1279 semi-annual reports on the 1444 ranges installed. AGA has apparently decided that's enough to give them something on which to arrive at the required conclusions, so they are winding things up this month. It may be another six weeks before the final report is released.

With electric ranges gaining steadily on gas models, it would seem that's not a moment too soon.

Current Reading

REPORT ON SURFACE PREPARATION OF STEELS FOR ORGANIC AND OTHER PROTECTIVE COATINGS—This is the second interim report of the NACE technical practices subcommittee 6-G covering recommendations and explaining methods whereby the surfaces of steel may be prepared for painting with organic and other coatings by means of weathering, wire brushing, grinding, flame conditioning, nozzle blast cleaning both wet and dry, wheel blasting, chemical pickling, electrolytic pickling, surface conditioning and numerous other related methods.

Designated Publication 53-1, the report may be obtained from the National Assn. of Corrosion Engineers, 1061 M & M Bldg.,

Houston 2, at $1 each. Five or more copies, 50 cents each.

AMERICAN STANDARD REQUIREMENTS FOR INSTALLATION OF GAS CONVERSION BURNERS IN DOMESTIC RANGES—This new 40-page pocket size book covers the installation of gas conversion burners in domestic ranges and makes available an authoritative standard for the examination of range conversion burner installations by local authorities in the field, and the preparation of local codes or ordinances for such installations. Adequately illustrated, it outlines the precautions that must be observed for installation and the test methods that must be used to assure safe operation. Copies may be obtained from the AGA Laboratories, 1032 E. 62nd St., Cleveland 3, for 25 cents each.

THE HEATING, VENTILATING AND AIR CONDITIONING GUIDE—The 31st edition, with a total of 1560 pages, features many important changes and additions: A new section on snow melting, completely rewritten chapters on electric heating and industrial exhaust systems, and a new chapter on water vapor and condensation in building construction. New information on industrial oil and gas burners, short chimneys, industrial degree-days, warm air system design, and unit heaters is also included. An ASHVE Psychrometric Chart is included.

Copies are available through American Society of Heating and Ventilating Engineers headquarters, 62 Worth St., New York 13, N. Y., at $7.50 each.

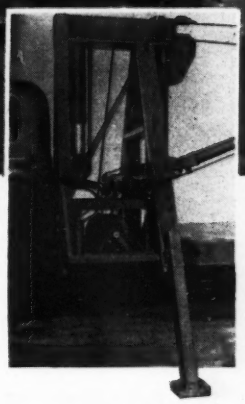
PHYSICAL CONSTANTS OF THE COMPONENTS OF NATURAL GAS AND GASOLINE—The third edition of CNGA Bulletin TS-401, this revision corrects a number of values shown in the previous edition of the tables of physical constants on the basis of recently published data. In addition to the tables of physical constants of hydrocarbons and other compounds associated with natural gas and a vapor pressure chart, the 17-page bulletin contains index and committee personnel.

The bulletin is available to CNGA members for $2.50, non-members, $3.00, from the California Natural Gasoline Assn., 510 W. Sixth St., Los Angeles 14.

PRIMARY AIR CONTROL DEVICES FOR ATMOSPHERIC GAS BURNERS—This reprint of Bulletin 22 presents extensive data covering studies of different means of controlling primary air injection with bunsen burners. It outlines tests made to determine the relative merits of various types of primary air adjusting devices in resisting reduction of initially regulated air-gas mixture ratios as a result of dust and lint stoppage.

The bulletin is available from the AGA Laboratories, Cleveland, or AGA headquarters in New York for $1.25 per copy.

Want to handle pipe CHEAPER?



You CAN...with this new truck-crane

PITMAN

HYDRA-LIFT

Mount a Pitman Hydra-Lift on one of your trucks and with this single piece of equipment, you can handle pipe faster and cheaper than you can with the *two or more* pieces of equipment you are now using!

How? With its swinging boom, Hydra-Lift loads pipe directly onto a trailer pulled by the same truck on which Hydra-Lift is mounted. The truck and trailer then move to the job site at normal truck speeds. At the job, Hydra-Lift is right there, ready to swing the pipe off the trailer, then lay it in the ditch. How many pieces of equipment are you tying up to do this work now?

Hydra-Lift mounts on almost any truck; two tons or larger recommended. Hydraulic power swings the boom 180°, lifts it through an arc of 100°. Boom telescopes from 12 to 17 to 22 feet. Loadline capacity up to 6400 pounds. Yet Hydra-Lift requires but 40 inches behind your truck cab. *Hundreds* of Hydra-Lifts are being used by contractors and utility companies all over the country to cut pipe handling costs!

MAIL THIS COUPON TODAY FOR FULL INFORMATION!

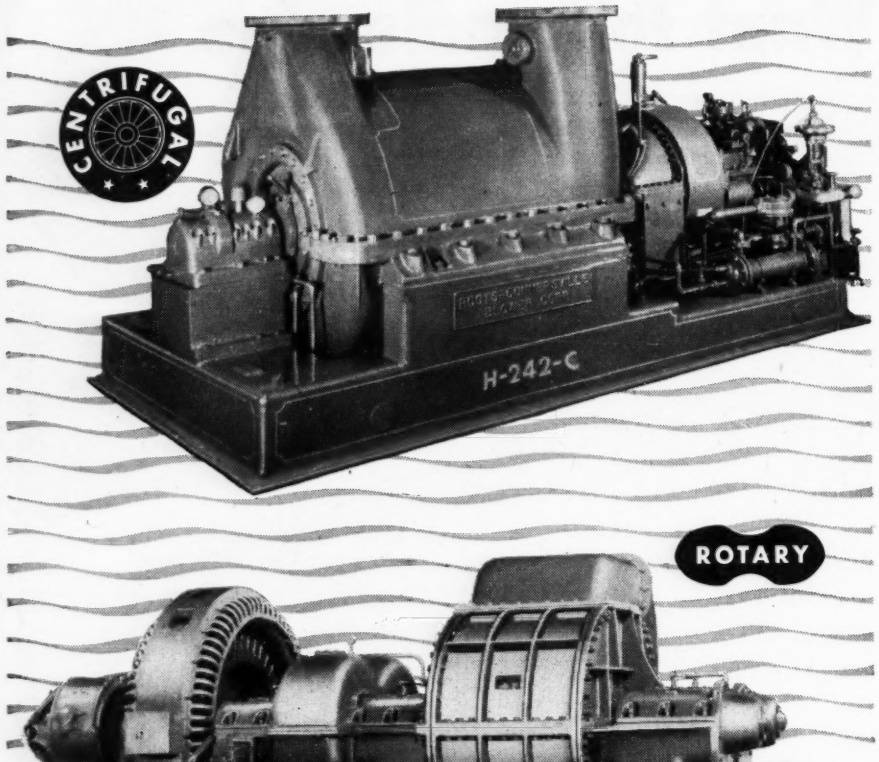
Pitman Mfg. Co.,
300 West 79th Terrace
Kansas City, Mo.

Please send me more information about the low-cost Hydra-Lift.

Name.....

Address.....

City.....State.....



BLOWER RELIABILITY A "NATURAL" WITH AIR-MINDED *Specialists*

The long record of reliability established by Roots-Connersville Blowers, Exhausters and related equipment is the natural result of almost a century of experience in the exclusive business of handling gas and air for industrial purposes.

But its more than just designing and building *a* piece of machinery. Such user satisfaction comes also from the wide range of capacities and types, from which the right unit can usually be selected. Especially important, our *dual-ability line* of Centrifugals and Rotary Positives enables us to make unbiased recommendations . . . a *dual choice* available only from Roots-Connersville.

Whatever your need may be in the handling of air or gas for industrial purposes, you can look to Roots-Connersville for unquestioned reliability and long-time economical performance. Ask us for specific recommendations on any problem of handling gas or air—in any quantity.

ROOTS-CONNERSVILLE

Exclusive Specialists in Handling Gas and Air

BLOWER BUILDERS SINCE 1854

ROOTS-CONNERSVILLE BLOWER

A Division of Dresser Industries, Inc.
153 Oregon Ave. • Connersville, Indiana

NEWS

Talking range displayed in Philadelphia store

A "talking" gas range that boasts of its features for all within earshot had all Philadelphia a-buzz following its recent showing at Lit Brothers store in Philadelphia.

A line of such ranges, each containing a concealed miniature tape-recording playback unit, was set up by the Caloric Stove Corp. As a customer approached the appliance, it would begin speaking, ticking off its various virtues.

In addition to the retail outlet, the talking range has been used to pep up dealer meetings by using a script prepared and recorded on the Message-Repeater to give the effect of a conversation carried on between the moderator of the meeting and a fictitious character whose voice came from the range. This summer, Caloric is sending its talking ranges on a tour of county fairs.

The device used to add the voice, a product of Mohawk Business Machines Corp., is only 6 in. long, yet contains a complete recording system and speaker. Messages can be changed at will by speaking into a plug-in hand microphone. The recording medium is a small interchangeable cartridge.

First gas incinerator campaign gets under way

All aspects of the automatic gas incinerator campaign launched recently by the American Gas Assn. are covered in a 12-piece display kit which includes two sets of three double pennants, a 10½-in. by 60-in. streamer, a 22-in. by 28-in. easeled poster in full color, and four jumbo price tags.

Two sales promotion booklets round out the published sales aids. "Ten Short Cuts to Quick Clean-ups With an Automatic Gas Incinerator" tells the incinerator story in eight pages of colorful illustrations, and "Gas Incineration Sales Maker" outlines sales appeals and methods which have proved helpful to dealers and salesmen. A full set of mats is also a part of the campaign.

This month the AGA plans to publish a case history book showing how local gas companies have promoted automatic gas incinerators profitably.

National Fuel Gas would buy Republic Light & Heat

The National Fuel Gas Co., New York, parent company of the Iroquois Gas Corp., Buffalo, will pay $4,650,000 for the Republic Light, Heat & Power Co., also of Buffalo, National Fuel President Leigh A. Brown told the state public service commission recently.

The proposed purchase, announced in

April, would mean that residents of Kenmore, the Tonawandas, and Niagara Falls will receive mixed gas; heretofore they have used manufactured gas.

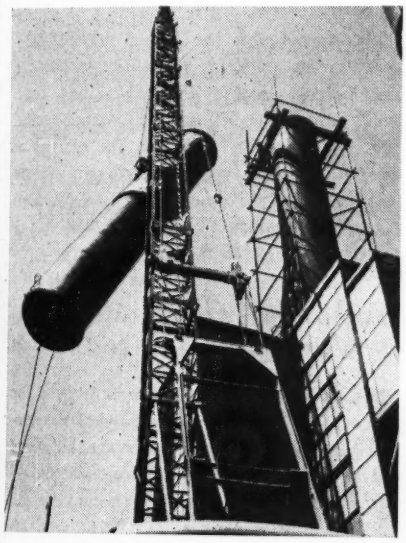
Mr. Brown said at a public hearing that it would be at least the summer or fall of 1954 before the new service would be available.

April appliance shipments continue upward trend

Following first-quarter trends already established, appliance shipments continued upward during the month of April. Gas range shipments totaled 232,400 units in April for a 27.5% gain over the 182,300 reported in April 1952, thus raising the 1953 total to 817,100 units, 16.8% higher than the 699,800 in the comparable period last year.

In other categories, shipments of automatic gas water heaters climbed to a 25-month high during April, when 218,600 units were shipped. This is a 42.6% increase over April 1952. Shipments for the first four months of 1953 totaled 797,500 units, a 32.7% gain over last year.

Also up during April were industry shipments of gas-fired central heating equipment. Sharpest increases were evidenced by furnaces, up 42.4%, and conversion burners, up 33.3%; boiler shipments were up 11.6%; overall shipments increased 13.7% over the first four months of last year.



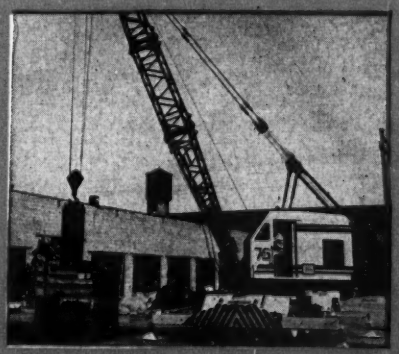
A 44-ft 3-ton section of the first glass-lined smoke stuck is shown being hoisted aloft by a 120-ft boom crane to form the top section of an 85-ft power house stack at the Milwaukee plant of the A. O. Smith Corp., pioneer of the new steel-ceramics union techniques. Employing methods developed in its own ceramics laboratory, A. O. Smith coated the stack section inside and out with two glass linings, each approximating five 1/1000th in. in thickness. The bonding of the linings took place at 1600°F.

GarWood 75

A New 3/4 yd. Trench Hoe to Dig Deep in Close Quarters!

The rugged new Gar Wood trench hoe digs to a 17′10″ depth, dumps at any height up to 19′3″ and cuts to 40″, 36″, 31″ and 26″ widths with optional dippers . . . Both the standard-duty 75A and the heavy-duty 75B available to suit your own working conditions! . . . All Gar Wood trench hoes are of gooseneck construction . . . Exclusive right angle drive—power actuated mechanical drum clutches —conical hook rollers and many other operating advantages for faster, easier work . . . Optional fluid coupling absorbs shock loads . . . Easy field conversion for all crane, shovel and clam operations including the new, exclusive, Gar Wood Foundation Borer — the machine that bores and bells in one operation . . . See your dealer for details —

FOR LIFTING UP TO 40,000 LBS.



Use Gar Wood's heavy-duty, model 75BT, truck crane! . . . Optional power load lowering and all the other Gar Wood features. Specially designed chassis for speed and mobility.

GAR WOOD GW INDUSTRIES

GAR WOOD INDUSTRIES, INC.

Findlay Division • Executive Offices • Wayne, Michigan

More than 50,000 cookies were baked by volunteers on all models of ranges and served to visitors during the tour of Roper's stove department.

Roper celebrates 65th year with open house and tour

Sixty-five years of gas range manufacture were celebrated recently by the Geo. D. Roper Corp. in Rockford, Ill. with an open house and tour of the plant. Despite stormy weather, 12,000 people attended the affair.

A major attraction was a bank of Roper ranges, at which were stationed a dozen volunteer women employees serving piping hot cookies to the visitors as they passed.

During the tour, animated movies kept children entertained while parents went through the plant. On arrival at the plant, visitors were given tickets to fill in with name, address, and telephone number, which were used at the drawing for Roper's newest model—the 30-in. Super Master—climax of the day's activities.

Awaiting natural gas, B.C. installs $100,000 main

With an eye to receiving natural gas, British Columbia Electric Co. has installed a $100,000 gas main which may ultimately serve the downtown area of Vancouver. The proposed distribution network being planned would cost several million dollars in the first stages.

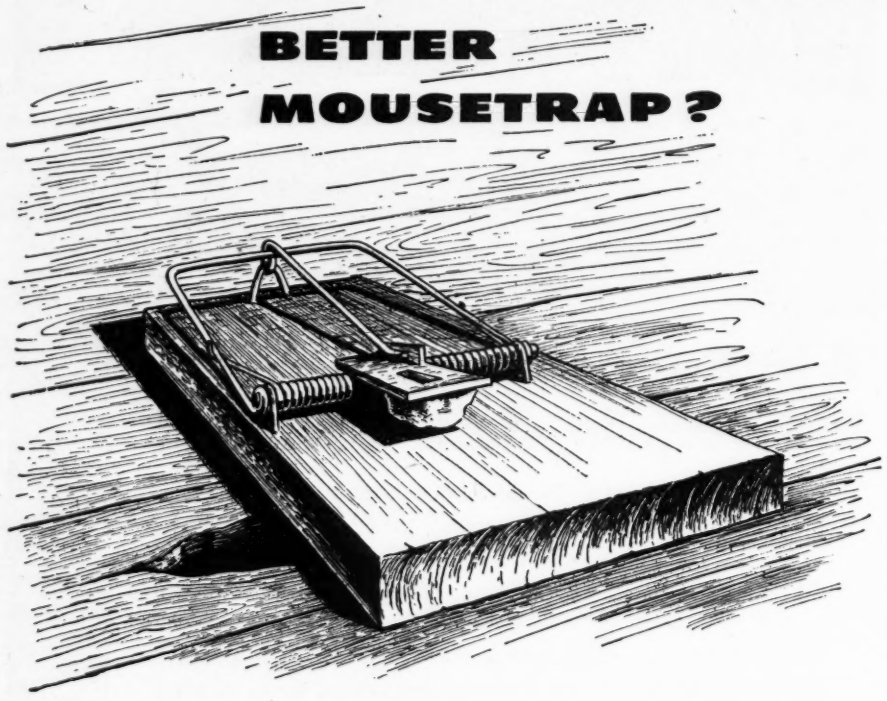
For the present the 16-in. 7000-ft line connects the company's Grandview holder with branch lines feeding Hastings East, North and South Vancouver, Burnaby, and New Westminster. But with the arrival of natural gas, the line will form part of the main distribution line into the city from New Westminster. The new main has a capacity of nearly 2 MMcf per hour.

Shortage of space and men at AGA Labs reported

Rising numbers of products submitted for approval by the AGA Laboratories has created a serious problem of shortages of space and personnel, H. Carl Wolf, managing director of the AGA reports. In his talk at the GAMA convention last month, he said requests for tests of central heating appliances were up 62% in the first 16 weeks of 1953 over the same 1952 period and that requests for water heater tests have increased 110% in the past year.

To overcome the space and personnel difficulties, two shifts are operating in the Cleveland laboratory and 11 college students who will be available during summer vacation are being trained on Saturdays.

The initial step in a proposed expansion program is to utilize the second floor of the recent south wing building addition. Plans



The story of the reward for a better mousetrap is proverbial. But the fact remains that most mice are still caught by this simple, economical and effective contraption.

Gas purification is a parallel case.

Iron Sponge, preferred for the removal of H_2S seventy-five years ago, is still preferred today. And for these same reasons . . . simplicity, economy and effectiveness.

Iron Sponge operates with high efficiency at high or low pressures, has excellent capacity and activity, gives long service between foulings and is simply and quickly regenerated.

CONNELLY Inc.

are also being considered for another similar wing addition to the north which will add approximately 20,000 sq ft for storage and testing and 25 new test stations.

First McCarter awards go to Boston Consolidated men

The unique distinction of being the first employees of a gas utility in the United States or Canada to win the McCarter medal and certificates of assistance for saving of a life by the use of the recently adopted back-pressure, arm-lift method of resuscitation goes to three employees of the Boston (Mass.) Consolidated Gas Co. Robert J. Quinn received the medal and Philip Kearney and John S. Russell were awarded the certificates of assistance by the American Gas Assn.

The presentation was made on behalf of the AGA by E. H. Eacker, president of Boston Consolidated, vice president of the AGA, and chairman of its executive safety committee. The men won the honor by their efforts in saving the life of a woman in her home in Dorchester, Mass.

The McCarter medal was made available through Thomas N. McCarter, former chairman and president of Public Service Electric & Gas Co., Newark, for successful resuscitations from asphyxiation by gas.

News notes

Empire Stove Co., Belleville, Ill., has launched a sales promotion campaign which is described in a folder containing examples of newspaper mats, customer leaflets, and store displays. Both Empire's recessed heating systems and floor furnaces are featured.

Seven companies have been appointed as distributors of Pittsburgh Coke & Chemical Co.'s Pitt Chem Series 100 coal tar coatings. They are: W. A. Case & Son Manufacturing Co., Buffalo; Detroit (Mich) Paint & Glass Co.; Minnesota Cem-Steel Co., Minneapolis; H. D. Fowler Co. Inc., Seattle; Anti-Corrosion Manufacturing Co., Atlanta; S. D. Day Co., Houston; and Bodwell-Lemmon Supply Co., Cleveland.

Tammen & Denison Inc., Chicago, has announced a substantial expansion of its electronics department in line with the rapidly increasing pressure on industry to come up with more exact answers to complex engineering, research, and production problems, and the resultant attention focused on the development and application of electronic measuring equipment. Tammen & Denison is staffed by more than 120 engineers, specialists in industrial design, consulting, product development, special machine design, plant layout and processes, and tool and die design.

A "one dollar does it" sales campaign has been launched by Servel Inc. which offers a

THE PREFABRICATED PROTECTIVE COATING

FAST, SAFE, ECONOMICAL

ARE YOU GETTING ALL THESE ADVANTAGES NOW

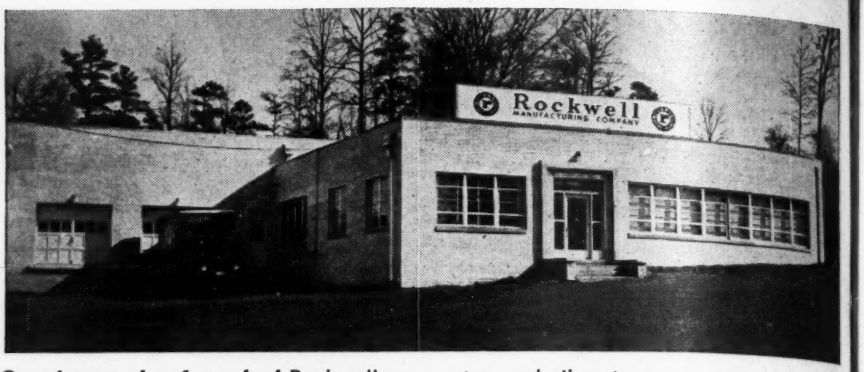
- Coating material of plasticized coal tar enamel or filled asphalt enamel.
- Reinforcement of woven glass textile fabric.
- Strip separator sheet to prevent sticking in rolls regardless of temperatures.
- Excellent bond to adjacent coating and pipe.
- Conveniently applied to full 3/32 inch thickness.
- No waste of bituminous material.

WRITE TODAY FOR A FREE DESCRIPTIVE FOLDER.

PROTECTO WRAP CO.
ENGLEWOOD, COLORADO

10-day trial "in your own kitchen" of any 1953 Servel refrigerator in return for a deposit of $1. At the end of that time, if the householder decides not to keep the refrigerator, it will be removed by the dealer without charge. The campaign, backed by an extensive advertising schedule in newspapers and trade publications and on billboards, radio, and television, will feature the automatic Ice-Maker refrigerator.

Deep-toned antique copper, a new finish for console gas ranges and built-in gas cooking equipment, was highlighted at the exhibits of the Home Economics Assn. convention last month in Kansas City, Mo. Developed by Chambers Corp., of Shelbyville, Ind., the new finish has the warmth and glow of copper, yet will not tarnish or discolor under normal usage.



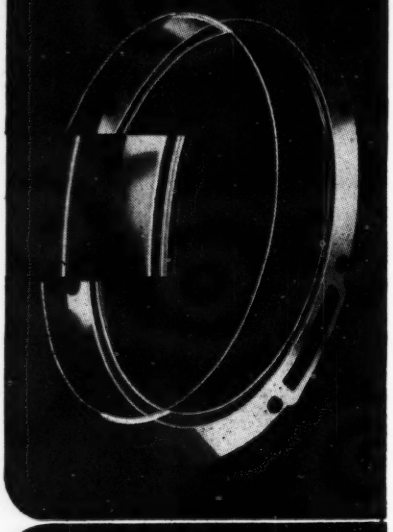
Complete stocks of standard Rockwell gas, water, and oil meters, gas regulators, Nordstrom valves and repair parts, and maintenance department are housed in this new building opened recently by Rockwell Manufacturing Co. in Atlanta, Ga.

Sensational New Lancaster S-7

GROOVE TYPE*

METAL RIM

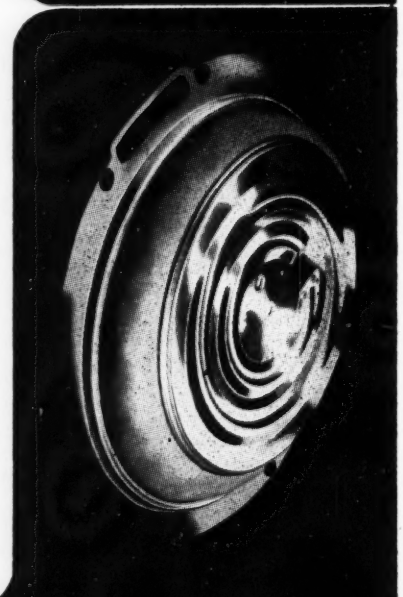
DIAPHRAGM



Smoother meter performance . . . greater measuring accuracy . . . longer service periods . . . 95% to 100% O.K. meters . . . are now possible with this improved Lancaster *groove type* metal rim diaphragm.

Perfectly centered in its inward and outward travel . . . perfectly balanced with surprisingly low differential . . . wonderfully smooth, consistent performance are important advantages of this new Lancaster S-7 diaphragm for small meter repairs and replacements.

Write for literature and prices today.



New Groove Type Metal Rim for greater rigidity and a perfect circle.

New Patented Endless Metal Tie Band for stronger clamping, more uniform depth of pocket.

New Improved Quality Rechrome Leather specially processed to Lancaster's own specifications.

*PATENT PENDING

METER PARTS CO.

A 2 million-lb shipment of polyethylene plastic, the basic component of Carlon flexible plastic pipe, has been imported by Carlon Products Corp., Cleveland, to be used —in addition to Carlon's regular supply of raw materials—to meet present demands. The raw material was purchased from British-operated industries and will be distributed from Houston to Carlon manufacturing plants throughout the U. S.

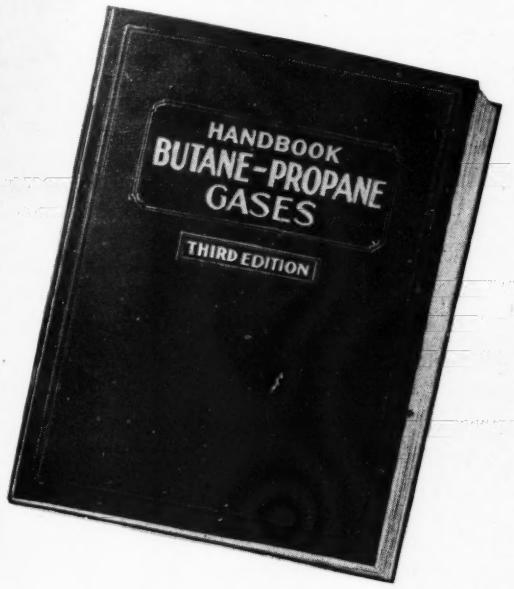
An expansion program and sale of $1 million in first mortgage bonds were approved by stockholders of the Arkansas Western Gas Co. when they met recently in Fayetteville. L. L. Baxter, company president, reported investment of approximately $1 million in new production, transmission and distribution facilities last year and predicts an equal expenditure this year. An expanded natural gas drilling program was also announced and it was reported that revenues and new customers increased 6% in 1952.

The American Car & Foundry Co., New York, has purchased the entire outstanding capital stock of the Avion Instrument Corp., Paramus, N. J. The Avion company develops and conducts research on electronic devices for defense and industrial uses.

Cities Service Co., Kansas City, Mo., is selling all its holdings in the Gas Service Co., Kansas City, a wholly owned subsidiary. Proceeds of the 1.5 million shares of common stock will be put into Empire Gas & Fuel Co., another subsidiary.

An arrangement has been made whereby Bucyrus-Erie industrial tractor equipment will be sold, distributed, and serviced by International Harvester Co. to IHC industrial power distributors and eventually will be manufactured by IHC. For many years the Bucyrus-Erie Co., Milwaukee, has been a manufacturers of bulldozers and scrapers for Harvester's industrial tractors, Bucyrus-Erie

The Only Complete Reference Book on Liquefied Gas Engineering, Installation and Operation



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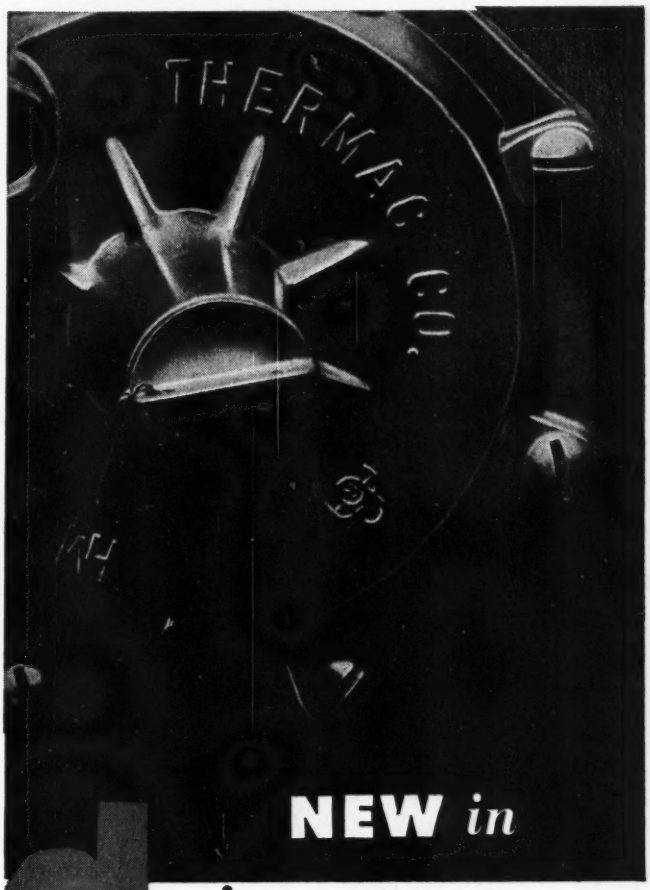
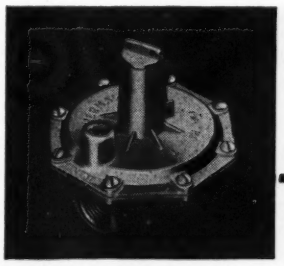


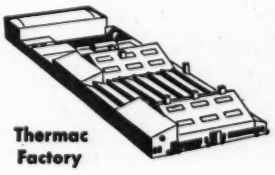
NEW *in* design-PERFORMANCE

Leadership in the industry demands that we constantly improve both our product and service. The new Thermac 8-sided Appliance Regulator achieves relatively larger effective diaphragm area with resultant higher capacities with relation to its outside dimensions. Greater sealing against diaphragm leakage, easier to install in tight spots, plus provision for vise grip are new special features.

Here in the new "T" Series you have a smaller regulator with more capacity at a lower price and of the highest quality obtainable. Send for our new catalog giving complete data.



Thermac "T" Series Appliance Regulator



Thermac Factory

SEND FOR NEW RATINGS

THERMAC
HM COMPANY
800 East 108th Street
Los Angeles 2, Calif.

selling the equipment direct to Harvester distributors. The need for additional facilities for the manufacture of its products, other than tractor equipment, has prompted Bucyrus to plan its eventual withdrawal from the manufacture of the equipment for Harvester.

Bama Sales Co., 1954 McNary Blvd., Pittsburgh, has been organized by G. Barrett Herr and Walter J. Clarke to operate as a clearing house for every type of surplus and obsolete materiels used by utilities. A monthly mailing list of every type of material offered for listing will be circulated among approximately 450 utilities, 200 used equipment and materiels companies, electric equipment companies, import and export companies, and representatives of foreign countries. For more than 29 years Mr. Herr was with Peoples Natural Gas Co., Pittsburgh, and was an active member of the purchasing and stores committee of the AGA. He recently completed 13 months service with PAD.

As the result of the introduction of natural gas, the Greenwich (Conn.) Gas Co. will reduce rates for 400 families that use gas for home heating and for summer air conditioning. A typical reduction would decrease a $24 gas bill to $17.

ARCCO
The World Over
wherever there is gas
ARCCO-ANUBIS
'Dry-Air GAS
GRAVITOMETERS
This new Arcco-Anubis Dry Air Gas Gravitometer determines and records specific gravity of gases automatically corrected to the humidity content of the air. The difference in weight between a column of GAS and equal column of DRY AIR is measured. This ratio represents the true specific gravity of the sample.
One bell of the instrument is filled with gas which is being measured, and the other bell is filled with dry air. Otherwise, except for the new instrument having one column for gas and one column for dry air, the unit is identical in operation to the standard gas gravitometer. When calibrated and properly installed, these instruments require little attention other than to wind the clock, ink the pen, and change the chart. Send for bulletin No. 101.
AMERICAN
RECORDING CHART CO.
3113 E. 11th St. • Los Angeles 23, Calif.
Available for Early Delivery
SEND FOR BULLETIN No. 101R2

People

Promotions

New officers and directors elected by the Dominion Natural Gas Co. Ltd., Buffalo, include H. L. RUDOLPH, vice president and director; D. P. SPENCER, treasurer; and R. M. ROBINSON, secretary. Mr. Spencer was also elected treasurer of Republic Light, Heat & Power Co.

LOUIS W. CABOT has been named vice president and secretary of Godfrey L. Cabot Inc., Boston, succeeding RALPH BRADLEY, who has resigned.

WLLARD M. JOHNSON, president of Magnet Cove Barium Corp., Houston, has been elected a vice president of the parent company, Dresser Industries Inc.

C. E. Eble

M. L. Waring

Consolidated Edison Co. of New York Inc. has announced promotions for several top officials. CHARLES E. EBLE, controller since 1946, has been elected vice president in charge of taxes, auditing, and general accounting matters. M. LE COMPTE WARING, assistant vice president since 1949, is now vice president in charge of the production and operating departments. C. WESLEY MEYTROTT, assistant general sales manager, and J. E. MCCORMACK, manager of the outside plant construction department, have been named assistant vice presidents. JOHN V. CLEARY, senior assistant controller, succeeds Mr. Eble as controller.

F. S. CORNELL has been promoted to the post of administrative vice president for A. O. Smith Corp., Milwaukee. Most recently Mr. Cornell was general manager of the company's Permaglas-Heating Division in Kankakee, Ill.

Arkansas Louisiana Gas Co. has announced several top administrative appointments. These include: T. J. HEARD, secretary; H. G. WALTERS, treasurer; H. C. WALKER JR., general counsel; R. R. O'NEALL, manager of civil engineering department; R. O. GARRETT, manager of the land, geological, and production engineering department; C. A. EGLEY, assistant treasurer; W. A. BROOME, head of general engineering department; D. E. SULLENBERGER,

manager of natural gasoline division; and M. D. LA GRONE, manager of rates and regulatory department.

General American Transportation Corp., Chicago, has promoted FRANK E. SEERY to the post of Pittsburgh district sales manager and RICHARD H. LAMBERTON to midwest manager, both of the plate and welding division. J. A. ROSS JR. has transferred from the Washington, D. C., offices to assist Mr. Seery, who succeeds BEN KING DUFFY.

RICHARD B. LOOMIS, secretary and assistant vice president, has been elected vice president and secretary of the Brooklyn Union Gas Co.

General Controls Co., Glendale, Calif., has named RICHARD G. RAY vice president in charge of manufacturing and I. H. NYE, treasurer of the company since 1946, has

R. G. Ray

I. H. Nye

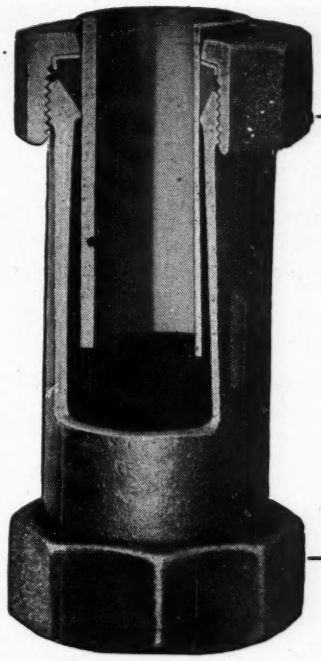
been elected to the board of directors. Mr. Ray will retain his responsibilities as plant superintendent.

The duties of manager of the Salonika division of the Public Power Corp. of the Kingdom of Greece have been assumed by V. H. MOON, rate research engineer for Ebasco Services Inc. Ebasco is engaged in designing, constructing, and putting into operation the nationwide power system in Greece.

CLAYTON L. NAIRNE and LIONEL J. CUCULLU have been elected vice presidents of New Orleans (La.) Public Service Inc. Mr. Nairne has been general superintendent of operations while Mr. Cucullu is chief engineer.

Several executive appointments have been announced by Pacific Gas & Electric Co., San Francisco. DUNLAP D. SMALLEY becomes vice president and assistant general manager; GEORGE H. HAGAR succeeds Mr. Smalley as vice president in charge of operations. ARTHUR J. SWANK is now vice president in charge of general construction, a new office; ROBERT H. GERDES is vice president and general counsel; EDMOND E. MANHARD succeeds RAYMOND KINDIG, who is retiring, as secretary.

Other appointments include: GEORGE A. PEERS, manager of electric operation;



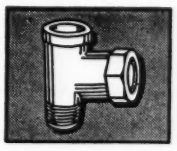
NORMAC

Couplings, Sleeves and Fittings

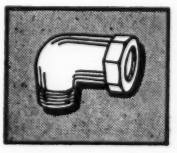
for maximum deflection, ease of "stabbing," complete confinement of the rubber!

So close are "Normac" rubbers confined at the gasket tip that possibility of flow is reduced almost to "nil." These couplings, sleeves and fittings . . . approved by gas utility men across the country for their time-saving features, ease of handling and dependable service . . . are available in a complete range of sizes. Made from air furnace malleable iron they provide greater wall thickness than pipe on which used.

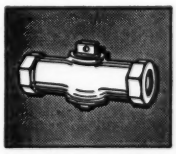
NORMAC COUPLINGS are made with 5" centers in all sizes. NORMAC SLEEVES are identical in design except that they are made with 10" centers. Nuts and gaskets are interchangeable.



Compression-End Service "Tee"—First fitting of this type ever produced with full coupling depth and special threads on male end to prevent dropping into old hand taps when used to replace standard threaded fittings.



Compression-End Service "Ell" — Extra depth makes it possible to "stab" pipe into stops and without measuring, pull back a safe distance to allow ultimate deflection eliminating possibility of strain against tap in main.



Compression-End Iron Body Brass Core Service Stopcocks—End the necessity of threading on the job plus the elimination of the threads themselves—combining all the advantages of NORMAC COUPLINGS and the best in stopcock design. 2½" coupling depth on each end.

Normac Brass Fittings Developed in 1939 for Use with Copper Tubing—Our complete line of brass fittings can be used either on new installations or where copper is run through old steel pipe in large or small openings. The center to end dimensions of NORMAC TEES correspond with old malleable iron fittings. This feature is extremely important in the use of these fittings in one foot openings where the tubing must line up with the steel which has been removed.

Write for the NORMAC CATALOG of Gas Distribution Equipment

NORTON-McMURRAY MFG. CO.

122 SOUTH MICHIGAN AVENUE - - - CHICAGO 3, ILLINOIS

Couplings • Motor Bars • Sleeves • Cocks • Bell Joint Clamps • Service Tees & Ells

THOMAS P. COPELAND, general superintendent of transmission and distribution; LEIGH H. SMITH, division manager at Red Bluff; H. H. COURTRIGHT, assistant to the vice president and general manager, Norman R. Sutherland; ARTHUR D. CHURCH, San Joaquin division manager; W. FRANK PAPE, North Bay division manager; and THOMAS P. JENKINS, East Bay division manager.

LESTER J. ECK, vice president and assistant general manager of Minneapolis Gas Co., has been named vice president and general manager. KENNETH B. LUCAS, manager of the suburban division, and GEORGE B. JOHNSON, manager of customer service, are new vice presidents.

L. J. Eck
Minneapolis

G. N. Bell
Sprague

G. N. BELL, former sales engineer, has been promoted to field manager of Sprague Meter Co. to coordinate all sales in the company's various branches and the home office in Bridgeport, Conn.

J. S. Phillips
Columbia

H. B. McClure
Carbide & Carbon

HARRY B. MCCLURE, a vice president since 1944, has been named executive vice president of Carbide & Carbon Chemicals Co., a division of Union Carbide & Carbon Corp., New York.

JAMES S. PHILLIPS, vice president of the Columbia Gas System Service Corp., has been elected vice president, general manager, and a director of Columbia's Charleston, W. Va., Group companies. His former duties relating to purchasing for Columbia in New York will be assumed by JOHN D. HAGERTY, who has been purchasing agent, and his business promotion work will be taken over by W. W. SELZER, who becomes business promotion manager.

New regional representative for Hamilton Manufacturing Co. in metropolitan New York and New Jersey is HOWARD L. BURNS JR.

T. M. OSBORNE has been appointed manager of the newly combined chemical and gas department of the engineering and construction division of Koppers Co. Inc., Pittsburgh. Previously, he served as manager of the chemical department.

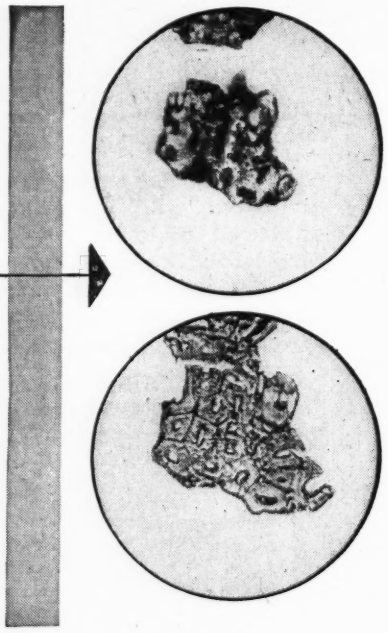
Recent executive changes at American Pipe & Steel Corp., Alhambra, Calif., include the election of L. E. HOWARD JR. to the post of secretary-treasurer. CARL B. DAHLBERG, secretary and sales manager, has been elected a director and vice president in charge of sales, and R. A. J. ENGLISH has been named vice president in charge of production and engineering.

THOMAS DEBEVOISE has been appointed supervisor of inventory control for the Peoples Natural Gas Co., Pittsburgh.

Blaw-Knox Co., Pittsburgh, has promoted CHARLES F. HAUCK to the post of sales manager of the chemicals plants division. He is succeeded by BRUCE ALEXANDER as assistant sales manager.

CECIL V. GRIFFITH, treasurer of Portland (Ore.) Gas & Coke Co., is a new director of the company, filling the vacancy created

PROOF!



1. CARBOSEAL ANTI-LEAK
Trade-Mark

stops leakage due to dried-out fiber packing in bell-and-spigot joints.

PROOF: The dry jute fiber (magnified cross-section, top) swells as much as 44% when it's treated with CARBOSEAL anti-leak (bottom). In a joint all the fibers swell, openings between them close up, and leakage stops.

2. CARBOSEAL anti-leak gives lasting results.

PROOF: Distributors of dry gas have used enough CARBOSEAL anti-leak to treat 13,000 miles of 3-inch equivalent main. And the first joints treated with CARBOSEAL anti-leak—20 years ago—are still tight.

3. CARBOSEAL anti-leak is inexpensive.

PROOF: Cost of CARBOSEAL anti-leak to treat 1 mile of 3-inch equivalent main is about $100.

4. CARBOSEAL anti-leak is easy and economical to apply.

PROOF: Prove this for yourself. Write for a copy of our booklet, Form 4506 — also, our 16 mm. color-sound movie, "CARBOSEAL Anti-Leak," which we will lend you without charge.

CARBOSEAL ANTI-LEAK

Carbide and Carbon Chemicals Company
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
In Canada:
Carbide and Carbon Chemicals, Limited, Toronto

"Carboseal" is a registered trade-mark of Union Carbide and Carbon Corporation.

C. V. Griffith
Portland Gas

D. A. Black
Empire

by the death of JOHN A. LAING, who had served as a director since 1918.

DALE A. BLACK has joined Empire Stove Co., Belleville, Ill., as branch manager for the northwestern territory covering northern California, Idaho, Nevada, Oregon, and Washington, with headquarters in Portland, Ore.

After almost 40 years with United Fuel Gas Co., Charleston, W. Va., W. J. HIGHTOWER has retired. He started with UFG in Pittsburgh in November 1913 and when he retired on May 1, he was a vice president of all the companies in the Charleston Group.

PAUL A. METZGER has joined Servel Inc., Evansville, Ind., as materials manager, a newly created position. He was formerly with General Motors.

Three key promotions have been announced by Consolidated Engineering Corp., Pasadena, Calif. HUGH F. COLVIN becomes vice president and general manager; ROBERT L. SMALLMAN is vice president in charge of sales, and VICTOR POLLOCK is treasurer.

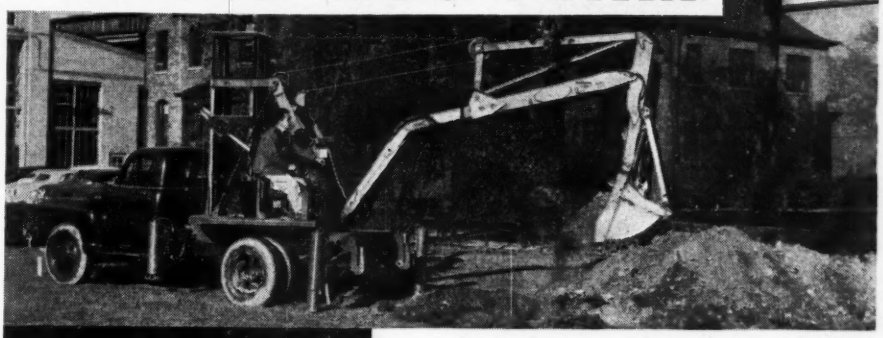
Deaths

RAYMOND CROSS, former president of Ohio Fuel Gas Co., Columbus, died last month. He was president of the Ohio Fuel Supply Co., predecessor of Ohio Fuel, and had been a vice president of the Columbia Gas & Electric Co., New York, and president of United Natural Gas Co., Oil City, Pa., and Pennsylvania Gas Co.

FRANK SNOWBERG, 62, veteran heating controls salesman for Minneapolis-Honeywell Regulator Co., Minneapolis, died June 3 in St. Petersburg, Fla., after a brief illness. He joined Honeywell 27 years ago in Minneapolis.

DEAN A. STRICKLAND, general sales manager of the Texas distribution division of United Gas Corp. in Houston and former president and director of the Southern Gas Assn., died in May after a brief illness. He was 53. Mr. Strickland began his career in the natural gas industry in 1930 when he went to work for United Gas as tax and insurance commissioner. In 1934 he was transferred into the sales department and in

A Money-Saving Crane-Hoe TEAM



Quick Boom Switch Means Easy Matching of Front-end to the Job!

Here the Hydrohoe digs a trench. By telescoping boom operator can peel off scallops at grade level — dig a smooth, even trench.

A quick switch and here's the Hydrocrane — setting gas line pipe. Telescoping boom permits reaching out without moving crane an inch.

Owners report switching Hydrocrane and Hydrohoe booms in less than an hour. This exceptional convertibility can save time — mean additional savings for you. For example, you can dig trenches or valve pits in the morning — convert to crane front-end — and set pipe or handle supplies in the afternoon.

With this quick, simple convertibility, the all-hydraulic Hydrocrane offers you 30H53

★ **50 mph. travel speed on open road**
★ **Quick-set hydraulic outriggers**
★ **Simple, hand lever control — no foot brakes**
★ **Telescoping boom that gives you eight extra feet of reach**
★ **Safety and exact precision of hydraulic operation**

See your distributor for a demonstration. We will be glad to send you his name.

BUCYRUS-ERIE COMPANY

South Milwaukee, Wisconsin

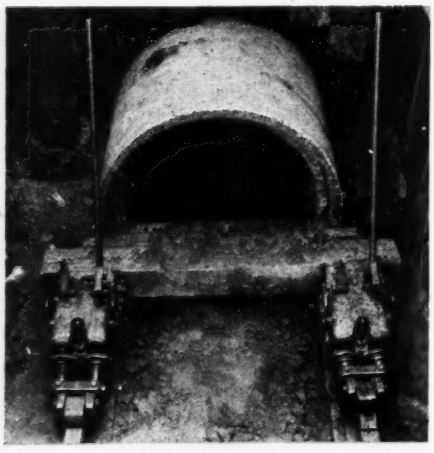
FAST, EASY WAY

TO INSTALL PIPE...

AT LOWER COST

PUSH PIPE UNDERGROUND WITH A GREENLEE HYDRAULIC PUSHER

Here's the simple, cost-cutting way to install underground pipe. Speed your jobs with a GREENLEE Pusher. One-man-operated, portable, simple to operate. No tearing up of pavement . . . eliminates extensive ditching, tunneling, backfilling, tamping, repaving. Cuts job time to a fraction. GREENLEE Hydraulic Pipe Pusher often pays for itself on first job. Two sizes — model shown above for pushing 3/4" to 4" pipe. Larger unit, below, for pipe over 4", concrete sewer pipe and large drainage ducts. Power pump (as shown above) also available for extra ease and speed of operation.

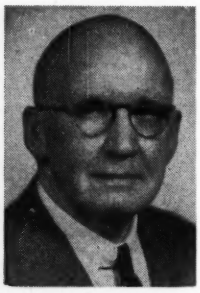


TOOLS FOR CRAFTSMEN
GREENLEE

Write today for descriptive literature. Greenlee Tool Co., 1947 Columbia Avenue, Rockford, Illinois, U.S.A.

that same year became general sales manager. Active in association work, Mr. Strickland at the time of his death was a member of the national advertising committee of the AGA and of the managing committee of the residential gas section.

D. A. Strickland
United Gas



John Laing
Portland Gas

JOHN A. LAING, 69, general counsel of Portland (Ore.) Gas & Coke Co. and Pacific Power & Light Co., died in May. One of the nation's outstanding utility lawyers, Mr. Laing served as counsel for the two utilities for 42 consecutive years. He was vice president of Portland Gas and Pacific Power from 1917; vice president of Northwestern Electric Co. from 1925 to 1947; and served continuously as a director of Portland Gas from 1918 until the time of his death.

WILLIAM L. LOVE, president of the Petroleum Engineer Publishing Co., Dallas, died in May. He joined *The Petroleum Engineer* in 1929, when it was organized, as advertising director, becoming vice president in 1934, and president in 1940.

JAMES W. MCLAUGHLIN, vice president of Union Carbide & Carbon Corp., New York, died in May. He was chairman of Bakelite Co. and Bakelite Co. (Canada) Ltd.; vice president of Carbide & Carbon Chemicals Co., and vice president and director of Carbide & Carbon Chemicals Co. Ltd.

GEORGE MCDOUGALL, who retired as assistant controller of Consolidated Edison Co., New York, in 1948, died recently.

CHARLES R. MEASURE, formerly superintendent of the gas department of the New Jersey Central Power & Light Co., died recently.

WILLIAM C. OECKLER, former general superintendent of gas customer service for Consolidated Edison Co., New York, died recently. He retired from ConEd in 1941.

CYRIL TASKER, director of the American Society of Heating & Ventilating Engineers' research laboratory in Cleveland, died suddenly late in May. He was 54.

JOHN C. PARKER, who retired as a vice president of Consolidated Edison Co., New York, in 1949, died recently following a short illness.

ASSOCIATIONS

Industrial gas school attracts big attendance

Twenty-eight states and two Canadian provinces were represented at the five-day industrial gas school held in Detroit recently. In all, 160 gasmen from 84 utility companies, manufacturers, pipeline companies, and service organizations attended the intensive training course, sponsored by the AGA industrial and commercial gas section.

Among the instructors was Section Chairman Terry Hart, who spoke on "The Responsibility of the Industrial Fuel Representative," based on the theme of integrity, accuracy, and energy. In his talk on "Relationships with Equipment Manufacturers," Lawrence R. Foote, Bryant Industrial Div., showed that it was the responsibility of the manufacturer to see that customers were satisfied and that the manufacturers' interests were parallel with those of the industrial gas engineer.

Charles E. Eeles, Ohio Fuel Gas Co., covered industrial applications where another fuel used in combination with gas gives better results than with the use of gas alone, and Raymond R. West, Minneapolis-Honeywell, lectured on "Temperature Measurement and Control," outlining the various types of measurement and control instruments and the general use which each could serve.

Production conference attracts 550 delegates

Every branch of the gas industry was represented at the intensive, three-day production and chemical conference held in May in New York. Nearly 550 delegates signed up for the affair. General sessions, luncheon conference, and panel discussions covered topics ranging from research to safety, and from gas production processes to the importance of chemistry in the gas industry.

In his review of the research program,

D. L. White (left) and B. M. Keys, Washington (D. C.) Gas, were greeted by W. H. Isaacs, Peoples Gas Light, at the production and chemical conference. Mr. Isaacs presided at general sessions.

Install new lines inside old ones with PlastiPipe

Avalon installation proves feasibility of inserting PlastiPipe inside existing mains over distances up to 600 feet or more

Gas "unaccounted for" in the old cast iron mains in the city of Avalon, California, made it known through leakage that new lines were needed. PlastiPipe Tenite II was threaded inside existing mains, without need for complete ditching. By cement-welding joints with a special inside coupling the PlastiPipe fed through easily. Complete with service lines of PlastiPipe the entire Avalon job was installed at a great saving in time, materials and money.

If you have a similar problem, it will pay you to look into PlastiPipe before proceeding. Both cost and endurance factors make Plastipipe an outstanding buy for utilities — as proven by hundreds of installations of plastic pipe throughout the U.S. For complete details see your plumbing jobber or write

PLASTIPIPE INC.

5544 West 104th Street, Los Angeles 45, California

FACTORY REPRESENTATIVES SOLVED AVALON PROBLEMS

During the Avalon installation a PlastiPipe factory engineer was on hand to help solve special problems as they arose, to avoid expensive tie-ups of men and equipment and to keep the job running smoothly.

Factory technical representatives are available to give you similar help, both before and during the actual installation. Write now for complete information.

---

you can count on SINCLAIR'S reputation for reliability

Sinclair's reputation as a supplier in the industry is your assurance of a *dependable* supply of a *uniform, high quality* LP-Gas. Moreover, you can confidently recommend Sinclair to industrial users who require standby Butane and Propane facilities.

Sinclair has a force of trained engineers — men who are thoroughly familiar with industrial and standby utility problems. Their experience is ready to serve you. Contact Sinclair today.

SINCLAIR OIL & GAS COMPANY

NATURAL GASOLINE AND LIQUIFIED PETROLEUM GAS SALES DIVISION

TULSA, OKLAHOMA

SINCLAIR

A Great Name in Oil

NOW AMERICAN MADE TO HIGHER STANDARDS!

RIGID VINYL PIPE AND FITTINGS

EXCLUSIVE KRALOY FORMULATION

NON-CORROSIVE

Guaranteed In Natural Gas Distribution Systems

Improve Your Operation Immediately With American-Made Kraloy D-150 Rigid Vinyl Pipe and Molded Fittings (150 psi working pressure). Available in I.P.S. OD sizes through 4".

Many Proved Advantages Over European Plastic Pipe; Highly Successful Since 1932

- HIGHEST TENSILE STRENGTH
- 10 TIMES LIGHTER THAN STEEL
  Two Men Can Lay 1000 Feet Per Hour
- MOST ECONOMICAL IN THE GROUND
  Low Initial Cost, Greatly Reduced Installation and Maintenance Costs

Write for latest specification brochure

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for CAST IRON PIPE

CALL OR WRITE

McWANE Cast Iron Pipe Company
Birmingham, Ala.
Pipe Sizes 2" thru 12"

Sales Offices
Birmingham 2, Ala.....P. O. Box 2601
Chicago 1, Ill.....333 N. Michigan Ave.
New York 4, N. Y.....80 Broad Street
Kansas City 6, Mo.....1006 Grand Ave.
Dallas 4, Texas.....3200 Maple Ave.

PACIFIC STATES Cast Iron Pipe Co.
Provo, Utah
Pipe Sizes 2" thru 24"

Sales Offices
Provo, Utah.....P. O. Box 18
Denver 2, Colo.....1921 Blake Street
Los Angeles 48, Cal.....6399 Wilshire Blvd.
San Francisco 4, Cal.....235 Montgomery St.
Portland 4, Ore.....501 Portland Trust Bldg.
Salt Lake City.....Waterworks Equip't Co.
Seattle, Wash.....Smith Tower Bldg.

AUTOMATIC INCINOR

GAS-FIRED INCINERATOR

A "MUST" in Homes with Automatic Heat
A FULL-PROFIT LINE • NO TRADE-INS
INCINOR IS APPROVED BY A.G.A. LABORATORIES
ACT NOW FOR COMPLETE DETAILS
INCINERATION DIVISION, BOWSER, INC., CAIRO, ILL.

now in its ninth year, T. L. Robey, coordinator of research for the AGA, outlined some of the steps taken to insure more familiarity with work being done in gas production work. According to his report, 47 projects now are under way, including two new processes for producing gas.

Institute of Gas Technology research reports were presented by E. F. Searight and H. R. Linden, reporting on the influence of operating variables upon substitutability of high Btu gases. A report on the new auto-hydrogenation process for making Btu oil gases as a substitute for natural gases was made by H. R. Dirksen and C. E. Pierson. Synthesis gas production in pressure coal gasification was discussed by E. J. Pyrcioch and C. G. Von Fredersdorff and a paper on selection of catalytic processes for natural gas substitutes was presented by Messrs. Dirksen, Von Fredersdorff and E. S. Pettyjohn, director of IGT.

Parallel sessions for the chemical and gas production branches of the section were held. At the chemical session, papers were presented on gas industry analyses, air pollution contaminants, and pipeline odorization control. Other subjects included methods of predicting interchangeability, preparing gas for use in determining the accuracy of a gas calorimeter, and controlling flame characteristics in mixed gas systems.

During the gas production session, such topics as organic coatings for corrosion prevention, L. P. gas plants, industrial standby plants, effects of stockpiling on coking properties, safety in operation and maintenance of standby production were presented.

Charles W. Person retires after 34 years with AGA

Charles Person

A long-time member of the AGA headquarters staff, and the first secretary of its publicity and advertising section, Charles W. Person, retired last month. He joined the AGA in that position in November 1919, six months after formation of the association.

Not only did he serve as advertising director of AGA, he was instrumental in the formation and growth of the Public Utilities Advertising Assn. and was in a key position when member companies joined forces 17 years ago to launch the first national co-operative advertising program promoting domestic gas uses.

As director of advertising, Mr. Person has been secretary for 17 years of the national advertising committee, and the domestic and industrial and commercial gas copy committees.

A tribute to his endeavors to continuously

and effectively raise the standards of advertising was paid him recently during the annual convention of the PUAA.

GAMA hears optimistic report by AGA president

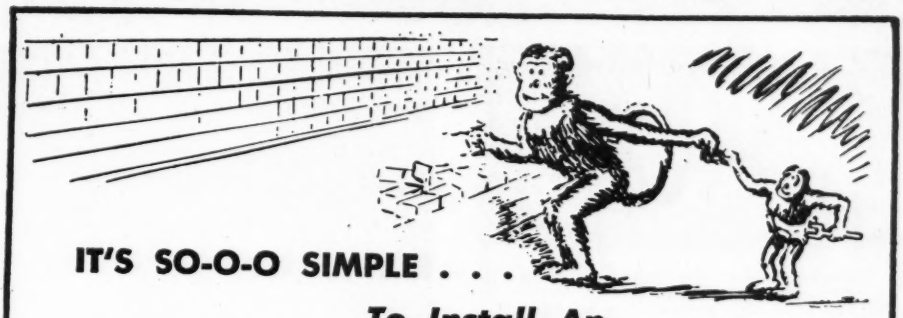
Certainty that the gas industry development program will be accepted by top management of the utility industry was expressed by AGA President Frank C. Smith as he addressed the 400 delegates to the 18th annual meeting of the Gas Appliance Manufacturers Assn. held in White Sulphur Springs, W. Va., May 20-22. James F. Donnelly, GAMA president, presented the record-breaking attendance with a "blueprint for action" to achieve the aim of the program.

Speakers at the convention included Lyle C. Harvey, president of Affiliated Gas Equipment Inc., who said that gas appliance manufacturers should concentrate on selling quality to combat cut-price promotion. "Too many of us blame the utilities for all our troubles. To listen to some of us one would think we feel the utilities should buy our output at a price 10 to 25% higher than we can sell the stuff ourselves—and give us shipping schedules exactly equal to our production possibilities."

A. F. Smith, A. O. Smith Corp., told the convention group that scientific market analysis can help manufacturers to "improve salesmen's performance, to find out where to sell more products and to cut selling expenses." He pointed out that many manufacturers are now using a uniform-trading area reporting system which makes it possible for each company to check its sales performance against the industry total on an area-by-area basis.

The new slate of officers elected for the coming year is headed by Sheldon Coleman, Coleman Co., Wichita, Kan., who succeeds President Donnelly. Other officers include: T. T. Arden, Grayson Controls Div., Lyn-

W. E. Davis, assistant general sales manager of Roberts-Gordon Appliance Corp., Buffalo, N. Y., is presented a meritorious service award by GAMA President Donnelly in recognition of his services as chairman of the gas conversion burner group.



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INSULATED GASKET UNION

The Insulator You Have Been Searching For!

- Metal to Metal Threads
- Perfect Electrical Insulation
- 300# W. O. G.
- Will Not Break
- All Insulating Parts in Compression
- No Field Education Required
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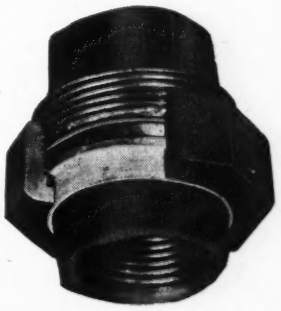

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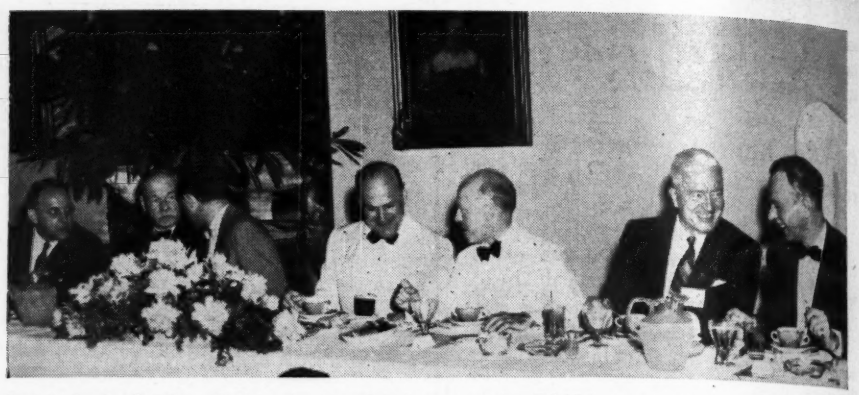


Gas industry leaders during the annual dinner at the GAMA convention are (from left): Harold Massey, assistant managing director of GAMA; George H. Richards, GAMA general counsel; Gerry Swinehart, Carl Byoir & Associates, public relations counsel; Frederic O. Hess, past president; T. T. Arden, newly elected 1st vice president; Col. W. F. Rockwell, past president; and James F. Donnelly, president.

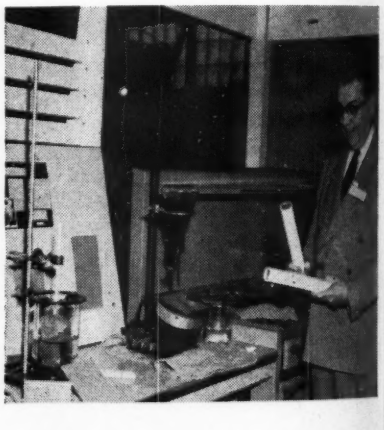
wood, Calif., 1st vice president; W. F. Rockwell Jr., Rockwell Manufacturing Co., Pittsburgh, 2nd vice president; and Lyle C. Harvey, AGE, re-elected treasurer.

Chairmen of divisions are as follows: W. T. Trueblood Jr., Magic Chef Inc., domestic ranges; Harold C. Day, American Radiator & Standard Sanitary Corp., househeating and air conditioning equipment; H. B. Carbon, Bastian-Morley Co., water heaters; John Christensen, Hamilton Manufacturing Co., clothes dryers; Gilbert T. Bowman, Rockwell Manufacturing, meters and regulators; Robert D. Smith, Incinerator Products Co., incinerators; D. E. DuPerow, Lincoln Brass Works, valves; Frank H. Post, Robertshaw-Fulton Controls Co., automatic controls; Thomas D. Bromley, Peerless Manufacturing Corp., direct heating equipment; George B. Horne, Watts Regulator Co., relief valves; F. C. Schaefer, American Gas Furnace Co., industrial gas equipment; Wendell M. Smock, Vulcan-Hart Manufacturing Co., hotel, restaurant, and commercial gas equipment; and Frank J. Kern Jr., Maxitrol Co., gas appliance regulators.

Eighteen firms cooperate for restaurant exposition

One of the largest single exhibits at the 34th annual National Restaurant Exposition held in Chicago in May was the AGA combined commercial cooking equipment exhibit where 18 cooperating manufacturers showed the latest models of their heavy-duty equipment.

Heavy-duty ranges were shown in nearly every combination desired, not only in stainless steel but in the new grey finish. Grid-



Detroit-Michigan's C. M. Jewell demonstrates the durability of the new grey silicone baked-on finish by hitting two pieces of pipe together, denting the pipe without marring the finish. On the table, food drippings from the pipette are dried and baked on a small sample heated to nearly 300° to show that stains can be removed with a damp cloth. The piece at left is suspended in frying fat at nearly 300°—without staining.

CALENDAR

July

13-17..National Housewares & Home Appliance Manufacturers Exhibit — Auditorium, Atlantic City.

20-24..Western Summer Radio-Television & Appliance Market—Western Merchandise Mart, San Francisco.

August

24-26..Appalachian Gas Measurement Short Course — West Virginia University, Morgantown, W. Va.

25-28..American Dietetic Assn. Annual Meeting—Los Angeles.

September

1-2....AGA - NEGA Conference — Boston.

9-11..Pacific Coast Gas Assn. Annual Convention—San Francisco.

10-11..Midwest Gas School and Conference — Iowa State College, Ames.

11..NEGA Industrial Division — Wachusett Country Club, West Boylston, Mass.

11..New Jersey Gas Assn. — Spring Lake, N. J.

26..SGA Transmission Section Round-Table on Rights-of-Way Problems — Tutwiler Hotel, Birmingham, Ala.

28-29..Independent Natural Gas Assn. of America Annual Meeting — Shamrock Hotel, Houston.

October

6-7....Texas Mid-Continent Oil & Gas Assn. — Rice Hotel, Houston.

7-9....NACE South Central Region — Mayo Hotel, Tulsa.

19-21..35th Annual Meeting, American Standards Assn.—Waldorf-Astoria, New York.

19-23..National Metal Exposition—Public Auditorium, Cleveland.

19-23..National Safety Council — Conrad Hilton, Congress, Morrison, and Sheraton hotels, Chicago.

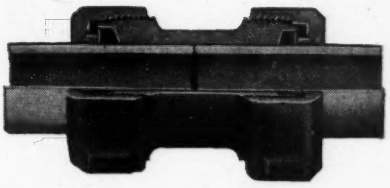
26-28..AGA Annual Convention — Kiel Auditorium, St. Louis, Mo.

November

9-12..API — Conrad Hilton and Palmer House, Chicago.

9-13..National Hotel Exposition — Kingsbridge Armory, New York.

11-13..Wisconsin Utilities Assn. — Hotel Schroeder, Milwaukee.



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dles combined with hot plates and broilers completed the display of counter equipment, which also included counter-type deep fat fryers as well as the standard styles. Some of the fryers were of the new high-efficiency types, incorporating features developed through the recent research project of the AGA Laboratories.

Waterless food warmers, conveyor type bread and bun toasters, steam jacketed kettles, vegetable steamers, dishwashing equipment, large volume hot water heaters, and gas controls of all types completed this particular exhibit which occupied 4000 sq ft of display space.

Gas equipment was not confined to the AGA exhibit alone. Spread throughout the giant show were displays of many manufacturers of diverse gas-fired equipment. Many exhibitors served a variety of foods and refreshments, necessitating the washing of many thousands of dishes; in every instance all the hot water for the dishwashing machines was supplied by gas-fired, large volume commercial water heaters.

Earl Huck elected chairman of Great Lakes personnel

Earl Huck

Earl G. Huck, director of research and training, Cincinnati (Ohio) Gas & Electric Co., was elected chairman of the AGA Great Lakes personnel conference at a meeting in Chicago on April 10.

Walter K. Paul, manager of industrial relations, Northern Indiana Public Service Co., Hammond, Ind., was named vice chairman and John M. Wilson, director of employee relations for United Fuel Gas Co., Charleston, W. Va., is secretary.

William B. Way was general manager of the biggest oil industry equipment show.

Past records smashed by oil industry's biggest show

The world's biggest oil industry equipment show, the International Petroleum Exposition, closed its Tulsa stay in May after 10 record-breaking days that saw an average daily attendance of 40,000 visitors. At the show's end, 369,835 visitors had traveled the 28-acre site to view the $100 million showcase of 1484 petroleum industry exhibitors.

Under the general management of William B. Way, the 30th IPE was termed "spectacularly successful" by its president of the past 25 years, W. G. Skelly.

One of the big events of the show was the naming of Harry J. Crawford, Emlenton, Pa., as "Pioneer of Pioneers." Six industry division pioneers were also honored. They were Dr. Godfrey L. Cabot, natural gas; W. L. Connelly, production; Edwin B. Reeser, refining; Wallace R. Finney, pipelines and transportation; Dr. George G. Oberfell, natural gasoline; and Wallace D. Wilson, supplies and equipment.

Although a date for the next oil show will not be set for about two years, Mr. Way believes that it will be held in four or five years.

Canadians gather for 46th annual meeting

Canadian gasmen gathered last month for the 46th annual meeting and convention of the Canadian Gas Assn. at the Windsor in Montreal, for four days of education, exchange of ideas, and entertainment.

Group and panel discussions were held on such subjects as sales and promotion, accounting and finance, production of manufactured gas, distribution, transmission, and plans for the future.

Speakers included W. F. Lougheed, Canadian Bank of Commerce, who presented "Some Observations on Canada's Economic Development"; W. H. Evans, Minneapolis-Honeywell, who illustrated his talk on "Seven Steps to Greater Dealer Sales" with a slide film; H. Filiatrault, Quebec Hydro-Electric Commission, speaking on "Training Tools for Safety"; C. R. Armstrong, Bell Telephone Co., telling "How to Select and Prepare Personnel for Management."

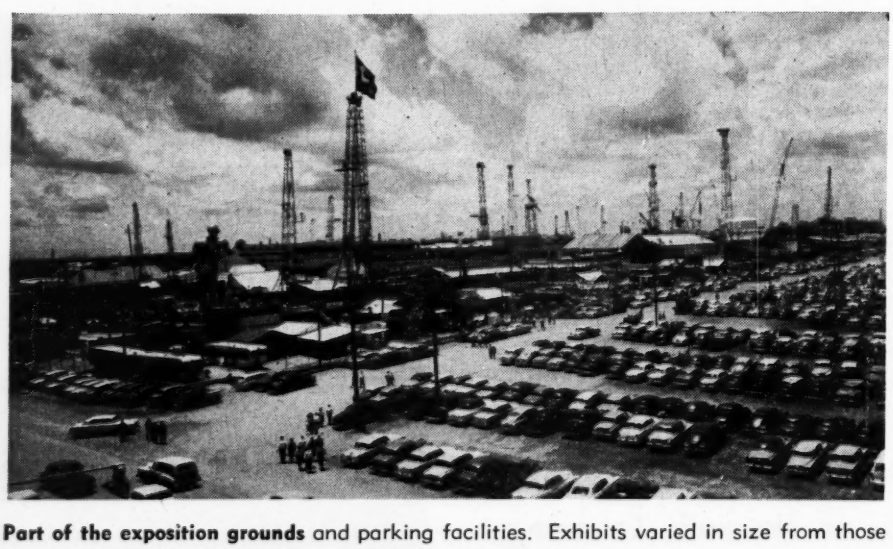
Association notes

C. S. Beard, Ebasco Services Inc., New York, was re-elected president of the New York section of the Instrument Society of America during the group's annual convention recently. Also re-elected were H. C. Mittendorf, vice president, and R. A. Hutcheon, secretary. Dr. Joseph Greenspan was elected treasurer, D. M. Breslauer will serve as journal correspondent, and J. T. Vollbrecht, L. E. Walz, and J. Maitland were elected to the board of directors.

The Practicing Law Institute will hold a special program for lawyers in corporations as part of its 12th annual summer session July 20-24 at the Hotel Statler in New York City. Gas utilities and manufacturers expect to participate again this year in the five-day program, which will be devoted to "Legal Aspects of Marketing."

R. W. Todd, director of Pacific Lighting Gas Supply Co., San Francisco, and a director of the California Natural Gasoline Assn., has been appointed a member of the 1953 award committee of the CNGA to present an award "in recognition of distinguished service in the advancement of CNGA." The award will be presented for the first time at the group's fall meeting in October.

Canadian sections of the National Assn. of Corrosion Engineers have been organized in Toronto and at Hamilton-Niagara. T. E. Watson, Corrosion Service Ltd., heads the Toronto section and C. F. Makepeace, Page-Hersey Tubes Ltd., chairmans the Hamilton-Niagara section.



Part of the exposition grounds and parking facilities. Exhibits varied in size from those viewed through a microscope to complete deep-drilling rigs.

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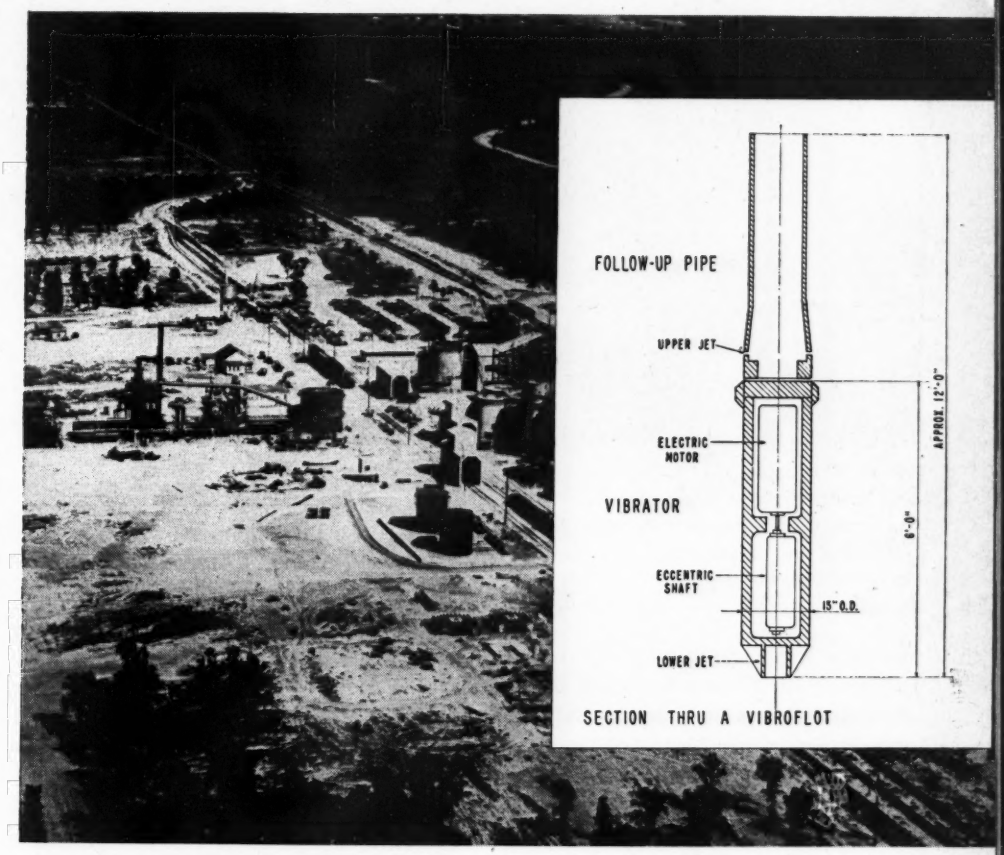

Near Bartow, Fla., a solid foundation for this uranium-phosphate plant (Fig. 1) was formed out of 160,000 sq ft of wind-blown sand in the first large scale application of vibroflotation. The vibroflot, shown in sectional drawing in the inset (Fig. 2), compacted the sand for the footings to an average depth of 13 ft. Its application in the gas industry, particularly for compressor station foundation, is now being studied.

"Vibroflotation" makes strong foundations out of loose, wind-blown sands

By **E. D'APPOLONIA** • Carnegie Institute of Technology, Pittsburgh

VIBROFLOTATION is the name given to a process devised for the compaction of loose, clean, free-draining granular soils. As the name implies, mechanical vibrations and simultaneous saturation with water are employed to move, shake, and "float" sand particles into a dense state. The unit used to produce the vibrations is called a "vibroflot." The vibrations compact the sand up to radial distances 5 ft from the vibroflot. And the vibroflot can be inserted into the ground to any desired depth. Compactions at depths 50 and 75 ft below the ground surface have been made.

Vibroflotation was invented in Germany during the early 1930's by Sergey Steuerman. The process was used extensively and successfully in Europe on difficult foundation problems, but until the early 1940's it remained practically unknown to this country. Extensive field tests of the process were conducted in 1945 in New York City and again in 1948 at the Enders Dam site in Nebraska by the Bureau of Reclamation. An interesting application of the process to the foundation of a chimney for dolomite kilns at Cape May, N. J., was reported in 1949.[1]

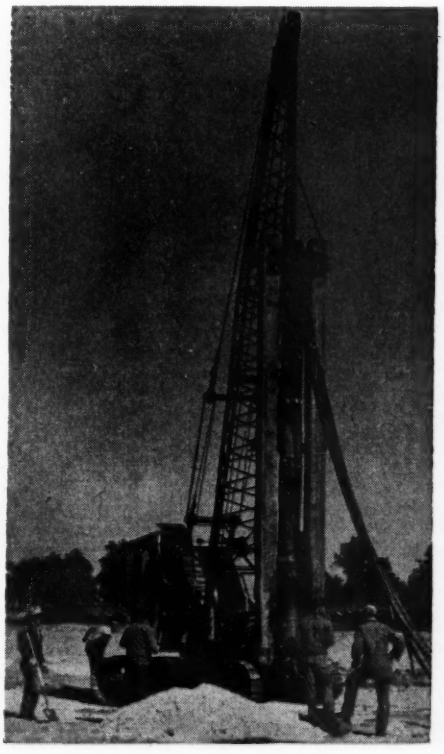

Fig. 3. Suspended vertically from the boom of a crane, the vibroflot is guided by wooden leads secured to the base of the crane.

The first large scale application of vibroflotation was made in 1952[2] near Bartow, Fla. *Fig. 1* shows the area of 160,000 sq ft of wind-blown sand that was compacted to an average depth of 13 ft for the foundations of the $12 million uranium-phosphate plant of the International Minerals & Chemical Corp. of Chicago. The compaction of the sands at the site of the new paper mill for Rayonier Inc. near Jessup, Ga., is a recent large scale operation.

The vibroflot,[3] as shown in *Fig. 2*, is a long, slender tube made up essentially of

Fig. 4. The depression is formed in loose sand prior to penetration of the vibroflot. The water causes the sand to settle, providing a pool and a saturated soil for penetration of the vibroflot.

two parts—the vibrator and the follow-up pipe. The vibrator is 15 in. in outside diameter and is approximately 6 ft long. It has two separate compartments and water passageways in the wall. The upper compartment has an elongated electric motor. This motor drives a large eccentric weight which is located in the lower compartment of the vibrator. The speed of the motor and eccentric is 1800 rpm, thus producing the powerful vibrations required for the compaction of a loose sand.

Water is used during the compaction to "float" the sand particles. Water jets are located at the bottom and top of the vibrator. The cooling water for the motor is piped through flexible pipes to the chamber about the motor and is discharged into the follow-up tube.

The follow-up pipe, which remains almost stationary while the vibrator is in motion, is attached to the vibrator by means of a universal. The main function of this follow-up pipe is to house the necessary water and electric lines.

The point of insertion of the vibroflot is located according to a pre-designed compaction pattern. Each project requires special consideration and the compaction pattern selected depends upon the data obtained from soil explorations and tests.

The vibroflot, as shown in *Fig. 3*, is suspended vertically from the boom of a crane and is guided by wooden leads secured to the base of the crane. The device is positioned over the point to be compacted and the motor is started. While the motor attains full speed the valve controlling the flow of water from the lower jet, located at the bottom of the vibrator, is opened. The water causes the sand to settle *(Fig. 4)*, providing a pool and a saturated soil for the penetration of the vibroflot. The unit is allowed to sink freely into the sand due to its own weight. The "quick" condition formed by the water escaping from the lower jet destroys the sand's resistance to penetration of the vibroflot.

When the vibroflot has reached the desired depth the water supply is transferred from the bottom to the top jet. The downward flow of water aids in the compaction of the loose sand. During compaction sand is shoveled into the crater *(Fig. 5)* as rapidly as it is needed to compensate for the "in situ" sand that is compacted. The vibroflot is allowed to operate at the bottom of the hole until the desired density is attained. It is then raised—continually compacting the sand—in lifts of 1 to 3 ft. The machine is normally raised at the rate of approximately 1 ft per minute.

Fig. 5. Sand is shoveled into the depression during compaction operation as rapidly as needed.

Achievement of the desired density at any stage during the compaction is determined by the power input of the electric motor. The denser the soil becomes the greater the resistance to movement and therefore the greater the power input needed to continue the compaction. An ammeter, shown in *Fig. 6*, records the current used during the compaction process. Since the ammeter readings and density of the soil can be correlated, the ammeter provides a means of controlling and knowing at any instant the degree of compaction.

Relative density is used to describe the degree of compaction of a granular soil. Expressed in terms of dry unit weight, relative density

$$D\% = \frac{\frac{1}{W_L} - \frac{1}{W_N}}{\frac{1}{W_L} - \frac{1}{W_D}} \times 100 \qquad (1)$$

where the subscripts L, D and N refer to the soil in its loosest, densest and natural states.[4]

It appears, as shown by experience,

Fig. 6. The ammeter in the foreground records the current used during the compaction process.

Fig. 7. This 9-ft excavation in compacted sand shows the vertical face of the excavation after compaction. The light area material was added during compaction.

that sands with a relative density of 70% or greater have good bearing capacity and are satisfactory as foundations for vibrating machinery. At Bartow site,[2] which had a 13-ft layer of loose sand, approximately 60 cu ft of sand were added during each compaction. The compactions were effective to a radial distance of 4½ ft from the vibroflot. Or a space of roughly 830 cu ft was influenced by each compaction. The 60 cu ft of added sand increased the dry unit weight of soil in this space by 7%. Since the original soil had an average relative density of 33% and a dry unit weight of 97 lb/cu ft, the added material was sufficient to increase the average relative density to 67%. *Fig.* 7 shows a 9-ft excavation in compacted sand. The light area shows the space occupied by the added sand. The face of the excavation was made along the centerline of a line of compactions spaced 7½ ft on centers. It is interesting to note that the surcharge of the crane located roughly 5 ft from the edge of the cut did not cause a failure of the vertical face.

Each compaction, as mentioned, increases the soil density up to radial distances 5 ft from the vibroflot. Increases in soil density at any point in a soil mass due to several compactions can be superimposed. Different compaction patterns were studied at the Bartow site,[2] to determine the most effective spacing of the vibroflot. These include:

1. Test pattern No. 1, line pattern 7-ft-4-in. spacings between the vibroflot.
2. Test pattern No. 2, square pattern 8-ft-0-in. spacings between the vibroflot.
3. Test pattern No. 3, equilateral triangular pattern 8-ft-0-in. spacings between the vibroflot.
4. Test pattern No. 4, square pattern 6-ft-0-in. spacings between the vibroflot.

Each compacted area was excavated and field density tests were made at depths 4, 6, and 8 ft below the ground surface.

The Bartow sands had loose and dense dry unit weights of 90 and 110 lb/cu ft. The results of field density tests expressed as relative density are plotted in *Fig. 8.* The curves show that the compaction is greatest near the vibroflot and decreases in an exponential manner as the distance from the vibroflot increases. Test pattern No. 4, the square with 6-ft spacings of the vibroflot, gave the greatest increase in relative density throughout the compacted region. The overlapping effect of each compaction is pronounced when one compares the two square patterns.

Based on the test results of *Fig. 8,* the compaction due to one penetration of the vibroflot is given by the dashed curve of *Fig. 8.* It is convenient for design to describe the variation in relative density with distance from the vibroflot in terms of an influence coefficient. Arbitrarily the value of the influence coefficient at a distance 6 ft from the vibroflot is chosen as one. The coefficient at each 1-ft interval toward the vibroflot is then scaled as the ordinate to the dotted curve of *Fig. 8.* A plot of influence coefficient against distance from the center of the vibroflot is shown in *Fig. 9a. Fig. 9b* gives the relation between influence coefficient and relative density.

As an application of the design curves shown in *Fig. 9,* consider the triangular pattern of *Fig. 10.* Concentric circles are drawn about each point of compaction. Each circle according to *Fig. 9a* is assigned an influence coefficient. Where the circles intersect the influence coefficients are summed. It is apparent that at point A, the furthest from compactions, the sum of the coefficients is least (12). At all other points within the triangular region the sum of the influence coefficients is 12 or greater. Entering *Fig. 9b* with this information we find that the relative density at all points

Dr. Elio D'Appolonia did considerable work on foundation problems in Alaska and northern Canada prior to entering the U. S. Completing his doctorate at the University of Illinois in 1948, he joined the faculty of Carnegie Tech, where he is now an assistant professor in civil engineering. In addition to his research work in properties of materials, fatigue of titanium, and development and application of numerical methods of analysis for structural design, he acts as a consultant in the fields of foundations, structural design, and stress analysis.

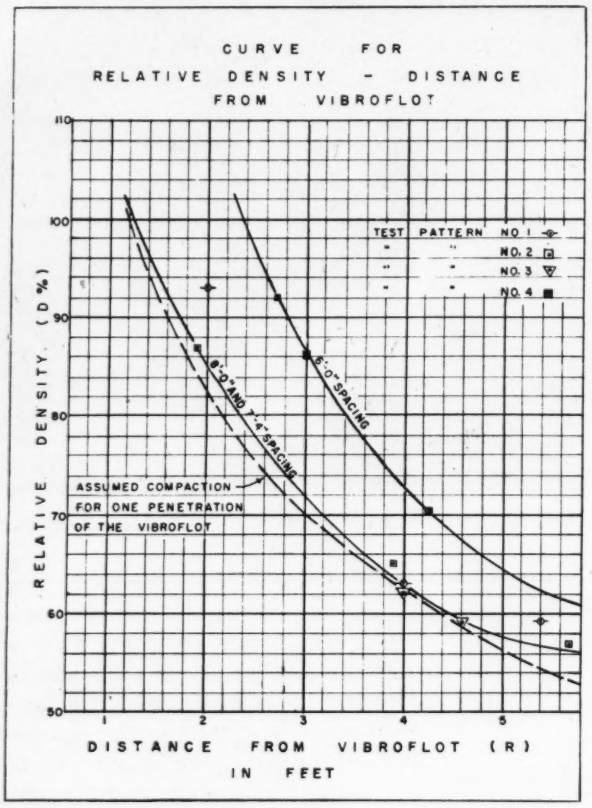

Fig. 8.

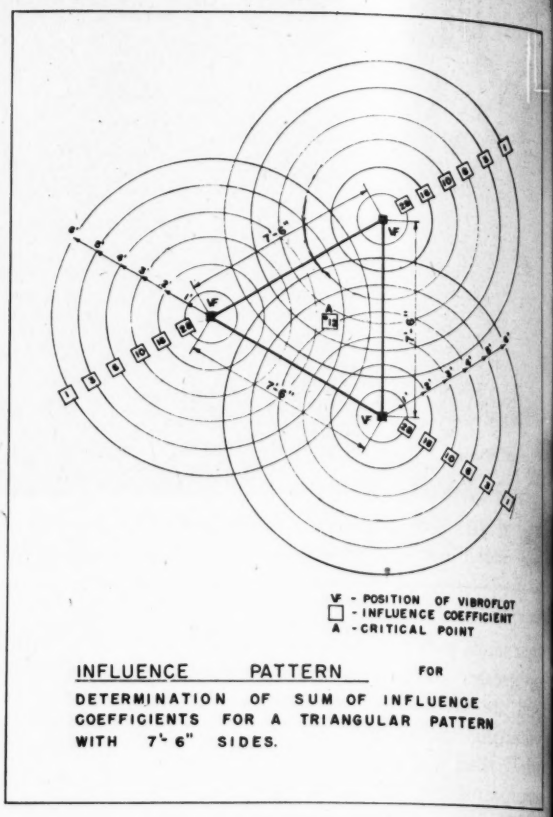
VF - POSITION OF VIBROFLOT
□ - INFLUENCE COEFFICIENT
A - CRITICAL POINT
INFLUENCE PATTERN FOR
DETERMINATION OF SUM OF INFLUENCE
COEFFICIENTS FOR A TRIANGULAR PATTERN
WITH 7'-6" SIDES.

Fig. 10.

within the triangular space should be 75% or greater. Field tests[2] conducted at the Bartow site support this design procedure.

Normally loose granular deposits have adequate bearing capacity for foundation loads that are applied statically. However, under vibratory loads the loose deposits are gradually, and sometimes suddenly, changed into a dense state. The settlements that result are often destructive and costly. It is important to change the sand from a loose to a dense state prior to construction. Vibroflotation is a simple, effective process that can be used to compact loose granular soils.

Best compaction is achieved in clean, free-draining granular deposits. Soils ranging from coarse gravels to fine sands can be compacted with a vibroflot. And, the process as described seems limited to granular deposits with less than 30% silt and clay.

The process provides a practical and economical means of compacting granular soils for foundations of tall chimneys, vibrating machinery, railroads, airport aprons and taxiways and other foundations subjected to vibratory loads. Vibroflotation can be used effectively to compact trench backfills, especially trenches that are backfilled with clean sand instead of the excavated material. The trench can be completely filled and then compacted to any desired soil density by inserting the vibroflot at suitable intervals along the trench. The main advantage of this simple operation is that it eliminates the costly and time-consuming practice of backfilling and compacting the sand in layers.

The standard crew for one machine consists of one foreman, three laborers, one electrician and one crane operator and helper. A single vibroflot under normal operating conditions can compact 600 cu yds of sand to 70% relative density in an eight-hour day.

Bibliography

1. "Vibroflotation Experiments at Enders Dam Frenchman Cambridge Unit Missouri Basin Project," Bureau of Reclamation, Research and Geology Division, Denver, Colo., July 27, 1948.

2. E. D'Appolonia, C. E. Miller Jr., T. M. Ware, "Sand Compaction by Vibroflotation." Submitted for publication to ASCE, August 1952.

3. B. Fruhauf, "Wet Vibration Puts Strength Into Sand," *Engineering News-Record*, July 23, 1949.

4. E. D'Appolonia, "Loose Sands — Their Compaction by Vibroflotation." Submitted for Symposium on Soil Dynamics, ASTM, February 1953.

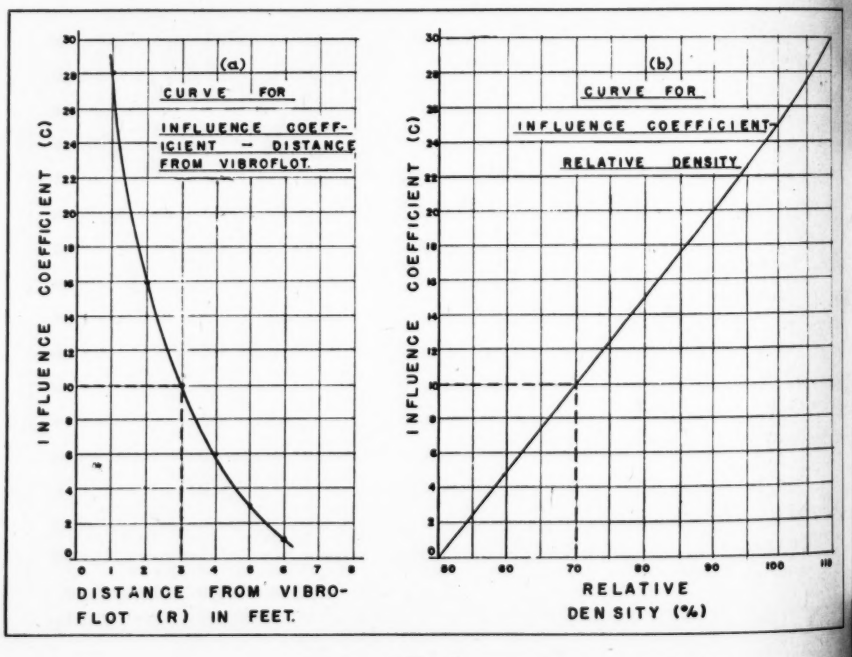

Fig. 9.

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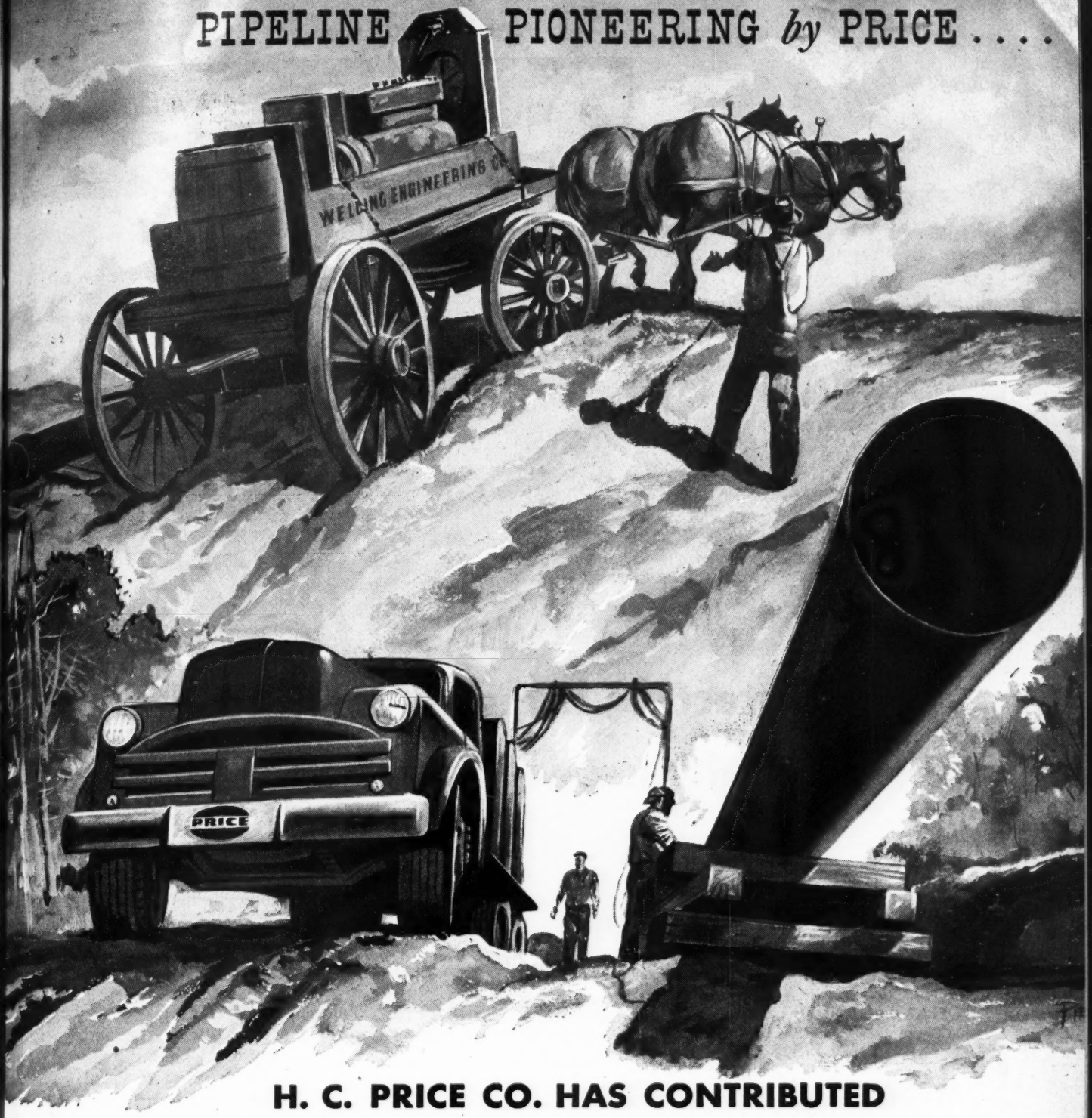

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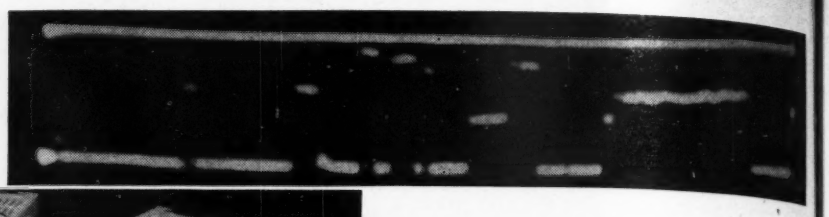


In a practical tryout of ultrasonic inspection, Southern California Gas Co. tested a 12-in. line (at left). Pictures obtained through the use of the equipment show pits or laminations such as those appearing in the picture above. In this instance, the subject was a ⅝-in. aluminum plate containing laminations at various depths. The top line is the top of the part, the intermittent bottom line is the bottom of the part; breaks in bottom indication are caused by shadows cast by the defects that are shown in their correct position within the part.

Detecting internal corrosion by ultrasonic inspection

Part 1: Improved equipment has made gauge applicable for pipeline work

By **DONALD C. ERDMAN** • ElectroCircuits Inc., Los Angeles

DURING the past three years, improvements have been made in the echo-type ultrasonic gauge that increase its value in corrosion detection work. These improvements, brought mostly as a result of the increasing need to detect flaws lying close to the surface of aircraft sheet aluminum, include the use of higher ultrasonic frequencies and more specialized radar-type circuits which now make it possible to obtain echoes from defects as close to the surface as 1/10th in. This means that the metal walls of a pipe can be measured if they are greater than .1 in. thick.

Heretofore, this type of instrument could inspect only metal ½ in. or thicker, because of the echo from the back surface of the metal being returned too rapidly to be detected. This instrument calculates the depth to a flaw or to the back surface by noting the time taken for ultrasound to travel to the target and back. Thickness determination, based on ultrasonic principles, has the great advantage that ultrasound will reflect from any discontinuity in the metal, and thus will not give false indications when the metal is backed with rust, coke, or liquid.[1]

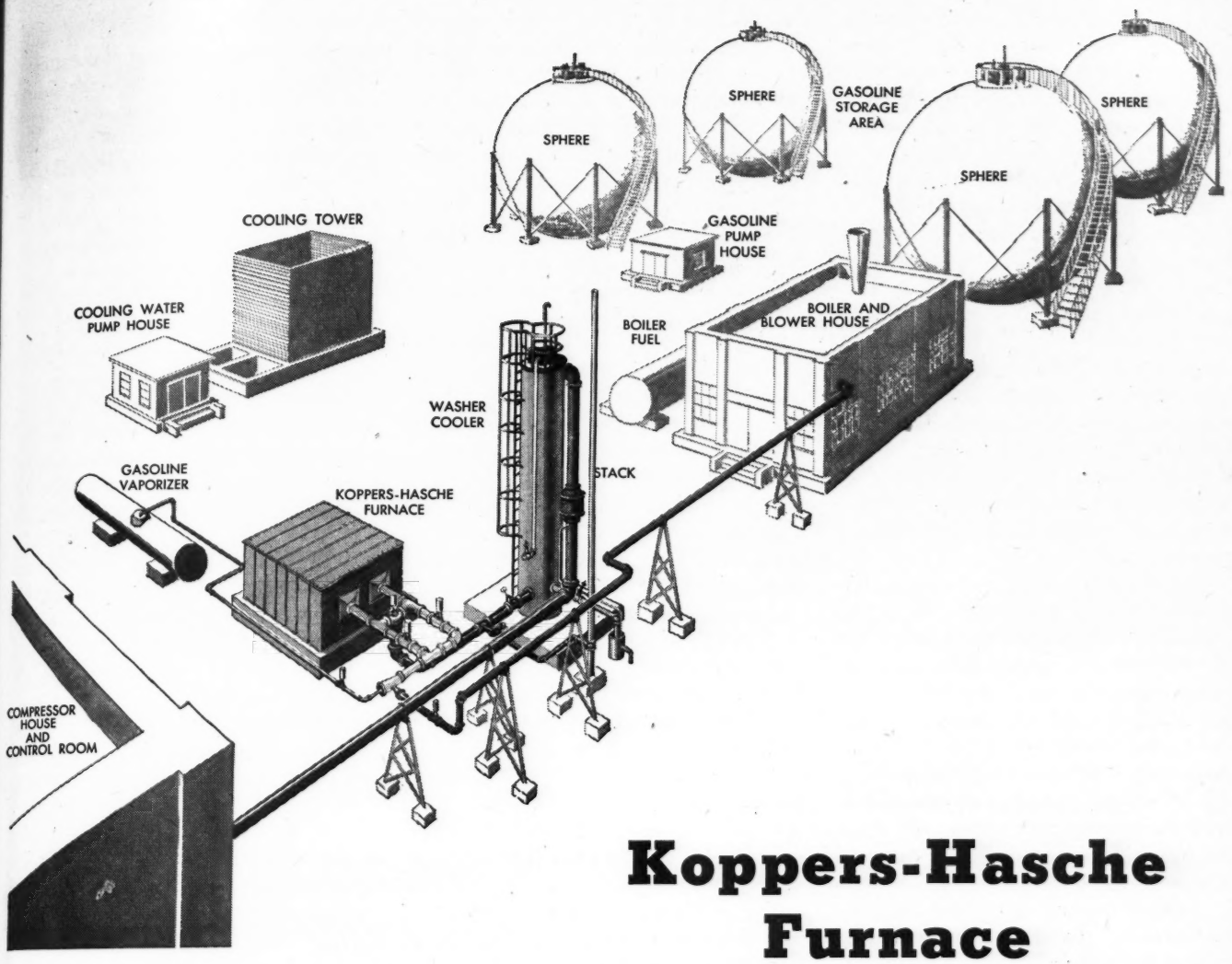
[1] Two other types of equipment that are available are the gamma ray instrument, which measures the back reflection from the inner wall, and the resonance-type ultrasonic thickness gauges. The gamma ray, essentially a thickness-determining instrument, gives answers that are the average thickness of too large an area to be useful where the corrosion consists of isolated pits. It is subject to misleading answers if the metal being inspected is backed with liquid, coke, or other deposits and, in the case of a pipeline with uncertain liquid level, the effect of the unknown backing can be difficult.

Although accurate and relatively inexpensive, the resonance-type gauge gives the average taken over approximately a square inch, thus giving little information about the depth of pin points of corrosion. It can, however, detect lamination in the metal.

Another factor that must be considered in testing for pit type corrosion is the need for the probing ultrasound beam to have a very small diameter. The diameter would need to be in the neighborhood of the diameter of the bottom of a corrosion pit. It has been found that a probing beam diameter of ⅛ in. will give satisfactory detail as to the thinness of metal directly over the pit.

When a pipe or the wall of a storage tank is being inspected with probe only ⅛ in. in diameter, it will be found that the rate of motion of the probe must be quite high in order to cover a suitable area. An example would be the task of thoroughly inspecting a square foot sample of plate. If no overlap of the path of the probe is allowed, it would take 96 strokes of 12-in. length to cover the square-foot section. It is much the same problem as faces a painter: it takes a small brush to show fine detail.

A rather obvious step is to mechanize the motion of the probe holder so that controlled, rapid scanning is possible. Scanners that have been designed range



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from rather simple but versatile mechanisms that can be adapted to various shapes to complex, fully automatic scanners with magnetic wheels that will climb the side of a ship and scan an 18-in. swath at the rate of 6 in. per minute. There is no doubt but that the speed could be increased several times.

Of considerable concern is the disposition of thickness data that are collected by such a device. Note that separate thickness readings are available from each of the ⅛- by ⅛-in. inspection areas. Thus in a badly corroded square foot sample, one would have 9216 answers to record. With suitable scanners, one can theoretically arrive at 1000 answers per second, i.e., 1000 thickness determinations per second. Thus a monumental information handling problem is posed.

One solution is to portray continuously on a television screen the cross-section view of the metal under the probe. Thus one can see at a glance how thick the metal happens to be at any instant. Pits and shallow areas are drawn to some exact pre-set scale, either one to one, or magnified. The inspector can then watch the TV screen, and photographically record the cross-section views only when the scanner has progressed to a corroded area.

Another method is to have an automatic camera record on movie film each pass of the scanner. Thus a given frame of the 35mm film would show one 12-in. long inspection pass. As long as these inspection passes are made in an organized manner, with one frame exposed per pass, the film can be projected in motion, giving the inspector a continuously unpeeled view of the metal. The disadvantage of this approach is that it involves using a camera with the resultant need for darkroom processing.

If standards can be set as to the depth of a corrosion pit that can be tolerated, electronic circuits can be applied which will ring an alarm every time a deep pit is encountered. The same alarm could plot areas that were smoothly eroded, or areas containing lamination. It is relatively simple to feed the alarm signal into a circuit that will show the rate of arrival of the thin spots. Thus this circuit would provide a figure of merit for a plate or pipe. This figure would be a measure of the number of deep pits per foot of scan, or per square foot of plate area. Such information would arrive at a rate that is practical to record with pen recorders.

We are attempting to build a version of this cross-section displaying instrument that draws cross-sections on paper, using two pens; one to draw the outer surface, and the other to draw the inner surface of the metal. It is certain that one would have to scan at a slower speed in order to give the pens time to write the information.

The problem of causing ultrasound to pass from a quartz crystal transducer into the wall of a pipe is rather complex. The best solution we have found to date is to use a small diameter water stream to couple the ultrasound from the quartz to the metal (see *Fig.* 8). Advantages obtained from use of the stream are that there is no abrasion to the quartz due to contact with dirt or rough areas on the surface of the metal, nor does the quartz have to be accurately aligned relative to the metal. Experience to date shows that it takes about a gallon of water per square foot of metal inspected. It is unfortunate that ultrasound will not travel more than 1/1000th of an inch through air.

It will be shown in the data presented by Mr. Gally that when inspecting gas transmission lines, there would be an advantage in having the scanner cause the probe to move in a spiral motion around the pipe. Thus one would not miss the bands of corrosion that appear to lie parallel to the axis of the pipe. Spot checks made with the scanner motion parallel to the axis of the pipe proved the difficulty of encountering an area of maximum corrosion.

No attempt has been made at our laboratory to inspect pipe from the inside-out. This has been due to fact that much work has already been done on this subject and to the fact that gas transmission lines have difficult access problems.

The equipment shown in the photographs illustrating Mr. Gally's discussion represents an experimental setup and consists mostly of laboratory equipment. Devices that can take advantage of the possible speed are now not available but could be designed and built to suit a desired application and could be available in approximately six months.

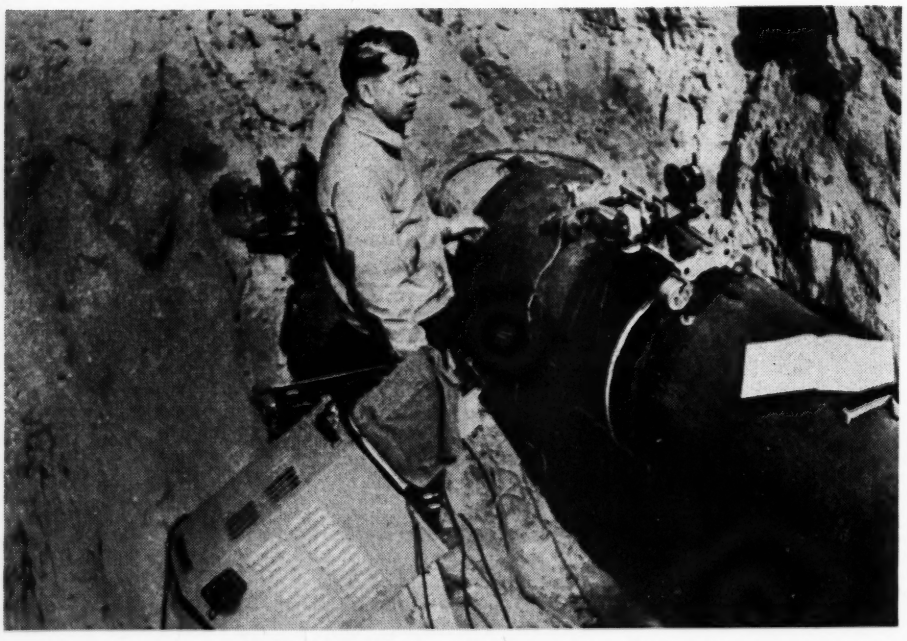

Fig. 1. Ultrasonic equipment installed on the 26-in. line for its initial field test.

Field tests prove accuracy, value of ultrasonic device

By **SIDNEY K. GALLY**
Southern California Gas Co.

Discharge pipelines at a Southern California Gas Co. compression station near Taft had suffered internal corrosion because of moisture condensation in the lines and the presence of traces of oxygen, carbon dioxide, and hydrogen sulfide. Although this corrosion has been arrested by the installation of gas dehydration plants to depress the dew-point of the gas below ground temperature, an inspection of the lines was planned to determine the extent and severity of the

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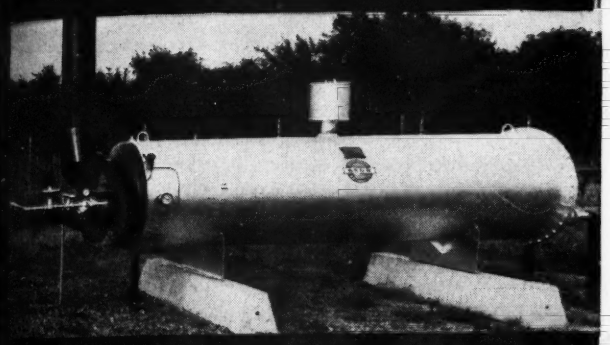

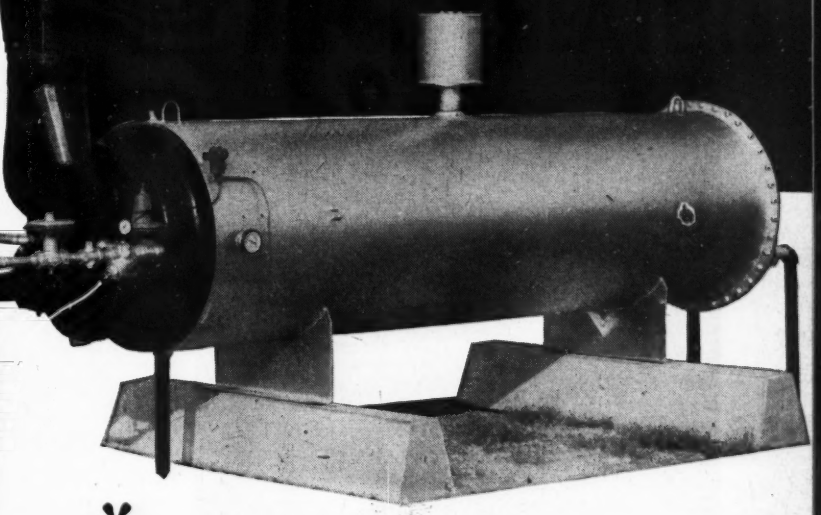

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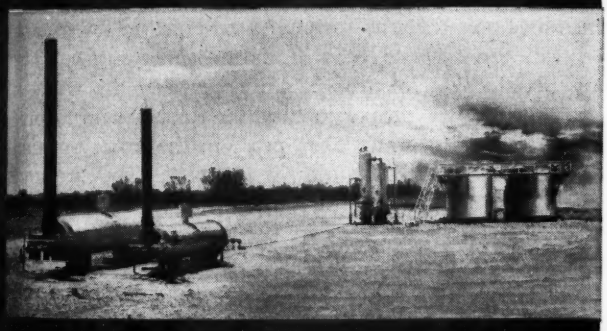

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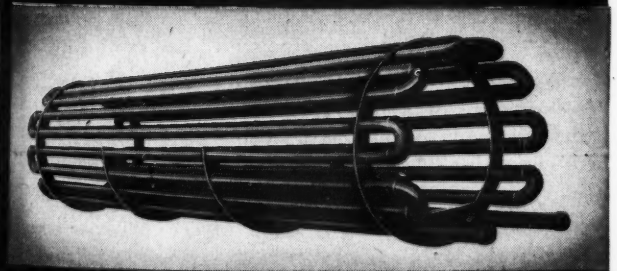

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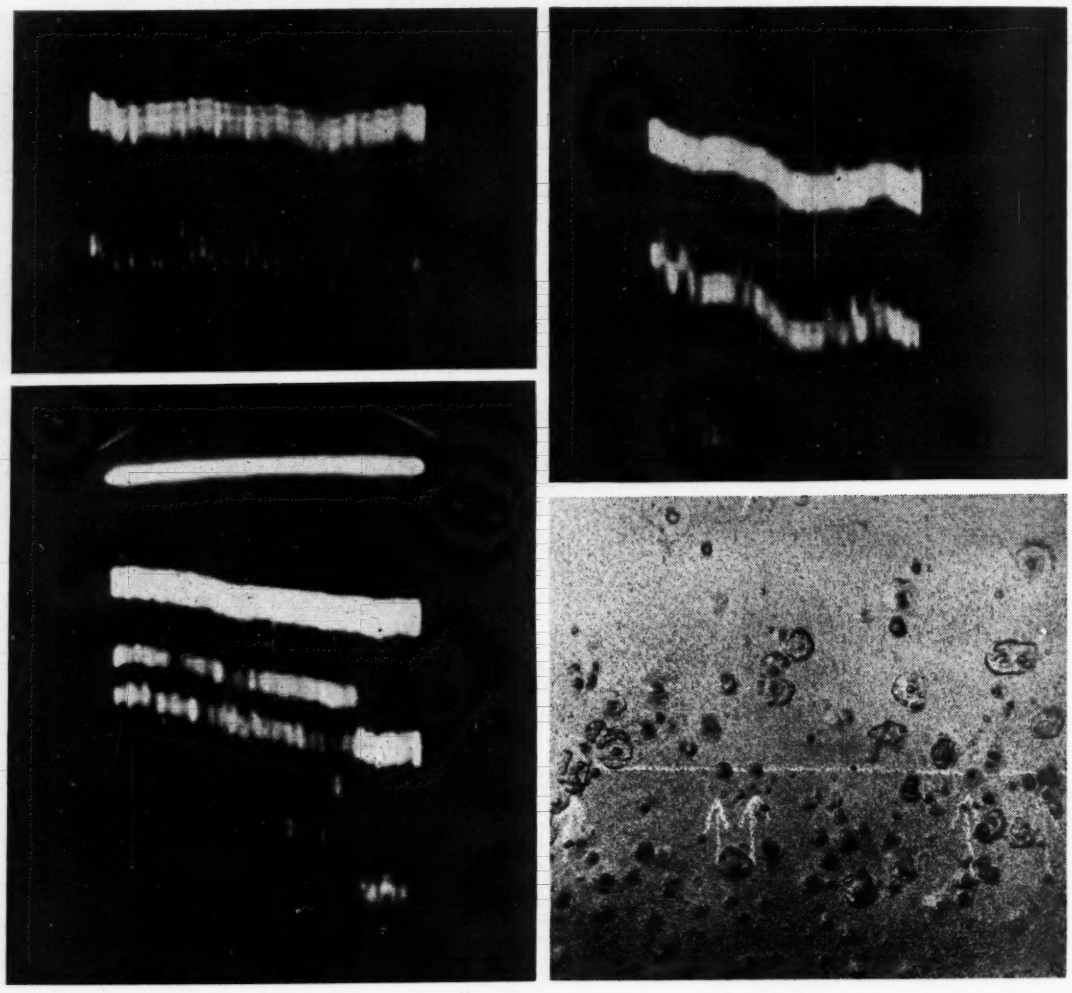

Fig. 2. Typical B-scan of pitted 26-in. pipe. (Top left.)

Fig. 3. Typical B-scan of an area of the 26-in. pipeline containing a lamination. Note the multiple reflections caused by the lamination. (Bottom left.)

Fig. 4. B-scan of corroded 26-in. pipe. (Top right.)

Fig. 5. Photograph of inside of same area of pipe in Fig. 4 after it was cut open and cleaned. (Bottom right.)

internal pitting. This provided an opportunity for a field trial of the ability of the ultrasonic inspection equipment made by ElectroCircuits Inc. to locate and measure internal pipeline corrosion, since the pipe could later be removed and the actual wall thickness compared with that measured by the ultrasonic equipment.

Inspections were made at one location on a 12-in. pipeline and at four locations along a 26-in. pipeline. The asphalt coating was removed from the pipe but there was no other preparation of the surface for the inspection.

Fig. 1 shows the apparatus in place on the 26-in. line. On the left is the oscilloscope on which the B-scan image appears with the camera for recording attached. Behind the oscilloscope, and partly obscured by it, is the chassis containing the electronic circuits which generate the ultrasonic impulses and receive the echoes. The carriage, which is held to the pipe by permanent magnet wheels, holds the quartz crystal transducer which can be scanned back and forth the length of the carriage. Also on the scanner carriage is the potentiometer which causes the oscilloscope beam to be deflected horizontally as the transducer is scanned along the pipe.

Electric power was supplied by a portable gasoline-engine-driven a.c. generator with voltage-regulating transformers. Water for coupling the ultrasonic energy to the pipe was supplied by gravity feed from a tank on a pickup truck, or from a water hydrant where possible. The local water was untreated except for the addition of a wetting agent to the tank.

Inspections were made at a minimum of four points on the circumference of the pipe at each location. Since the corrosion was suspected to be greatest near the bottom of the pipe, three out of four inspection points were marked on the bottom third of the pipe. Experience showed that a better procedure was to search for the corroded areas by moving the scanner while watching the oscilloscope. When thin spots or defects were located they could be marked with paint on the pipe and a permanent record of the oscilloscope trace made with the camera.

The ultrasonic inspection disclosed that the 26-in. pipe was pitted at many points. A typical photograph from the oscilloscope screen is shown in *Fig. 2*. The upper trace is the echo from the outer surface of the pipe, the lower trace the echo from the inner surface. The vertical distance between the traces is proportional to the thickness of the pipe wall. The "pips" in the lower trace indicate pits in the pipe. The curvature of the traces is caused by a variation in the distance between the transducer and the pipe as it is moved along the pipe.

The inspection also disclosed that there were laminations or other internal defects in some of the pipe. *Fig. 3* shows the B-scan of an area where there was a lamination in the pipe. The additional echoes are caused by reflections of the sound between the lamination and the pipe surfaces.

All the pipe which had been inspected ultrasonically was removed for a complete examination. The inside of the pipe was coated with a thick layer of corrosion products. There were many large rust tubercles and beneath each tubercle was a pit in the steel.

The pits in the 12-in. pipe lay in two rows 1 to 2 in. apart along the bottom of the pipe. The deepest pit was 0.100 in. in depth. The ultasonic inspection

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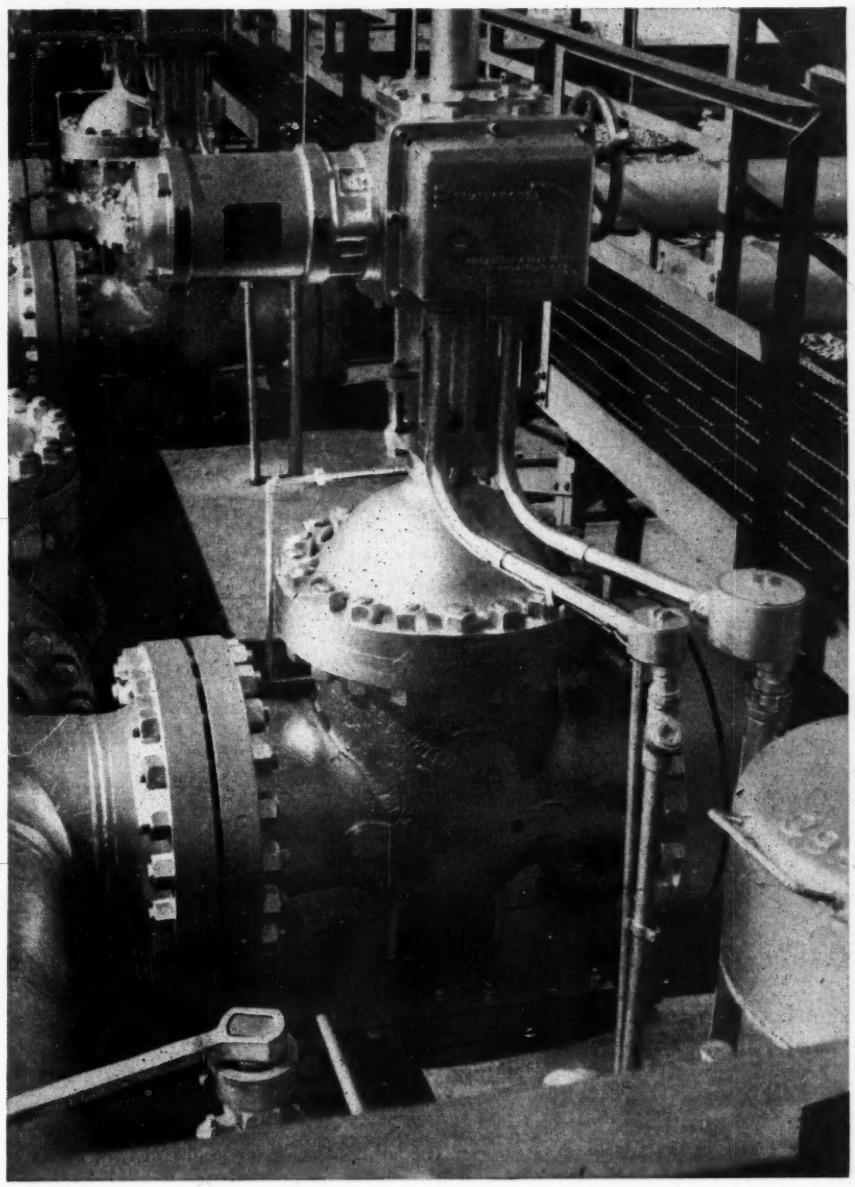

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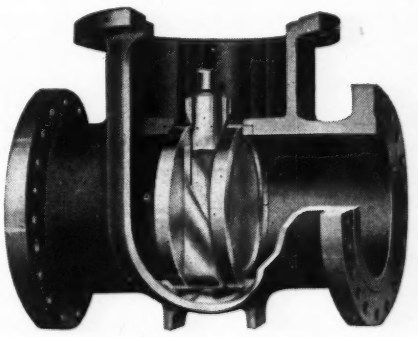

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Fig. 6. B-scan showing lamination near the outer surface of the 26-in. pipe. Multiple reflections caused the second apparent lamination. (Bottom left.)

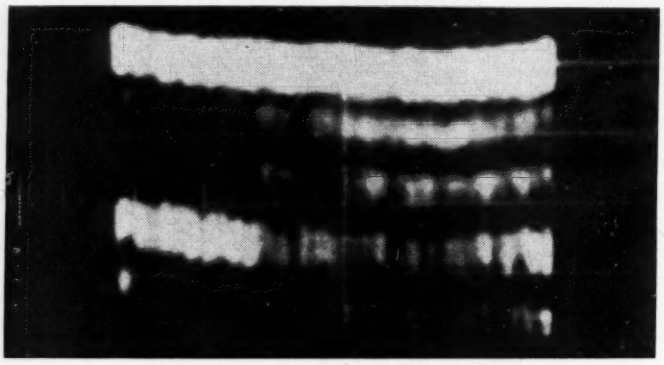


Fig. 7. Cross sectional view of the pipewall after sawing and etching showing open seam disclosed by the ultrasonic inspection. (Right.)

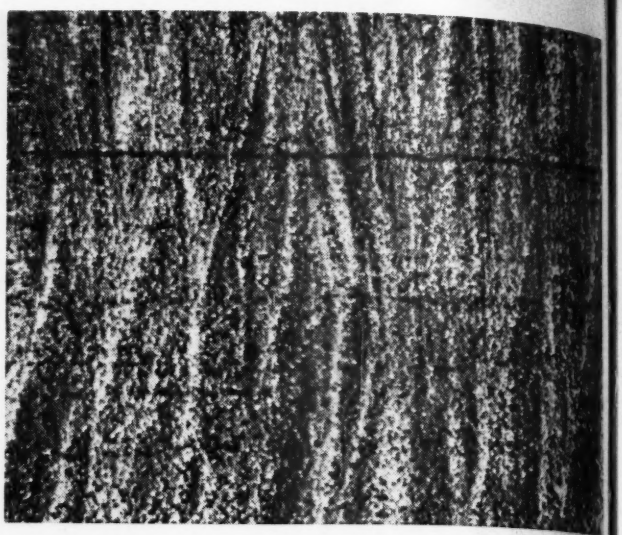
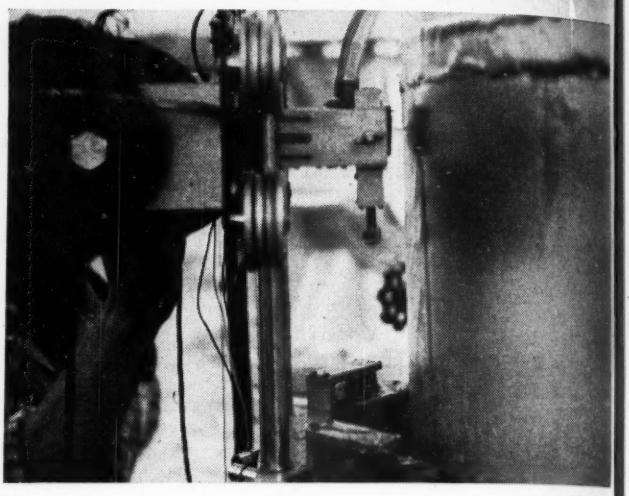


Fig. 8. Hand-operated scanner, held to the side of a scrubber by magnetic wheels. Note the water stream which couples the ultrasound to the metal wall. (Bottom right.)



failed to disclose this corrosion because the scan on the bottom of the pipe had been made midway between the two rows of pits. The remainder of the pipe was only slightly corroded except for an occasional isolated pit. The ultrasonic inspection records showed the pipe wall thickness to lie between 0.32 and 0.34 in. The thickness measured with a micrometer varied between 0.322 and 0.338 in., except for the pits.

At the first location on the 26-in. line, there was pitting in the top portion of the pipe, the deepest pit measuring 0.080 in. Again, because ultrasonic inspection had been made at arbitrary points on the circumference of the pipe, the worst pitting was not detected. However, a slight defect was located about midway through the pipe wall. Pieces of pipe which included this defect were cut out and etched in a hot hydrochloric acid solution. The etching disclosed a dark line, in the pipe wall parallel to the surface, which seemed to be an inclusion or segregation in the metal rather than an actual open seam.

At the second 26-in. line location, the ultrasonic inspection showed pitting at most of the points scanned. Examination of the pipe disclosed pits which corresponded exactly in position with marks made on the outside of the pipe at the time of the ultrasonic inspection. The minimum wall thicknesses determined from the photographic records of the ultrasonic inspection were within 0.01 to 0.02 in. of the measured minimum wall thicknesses.

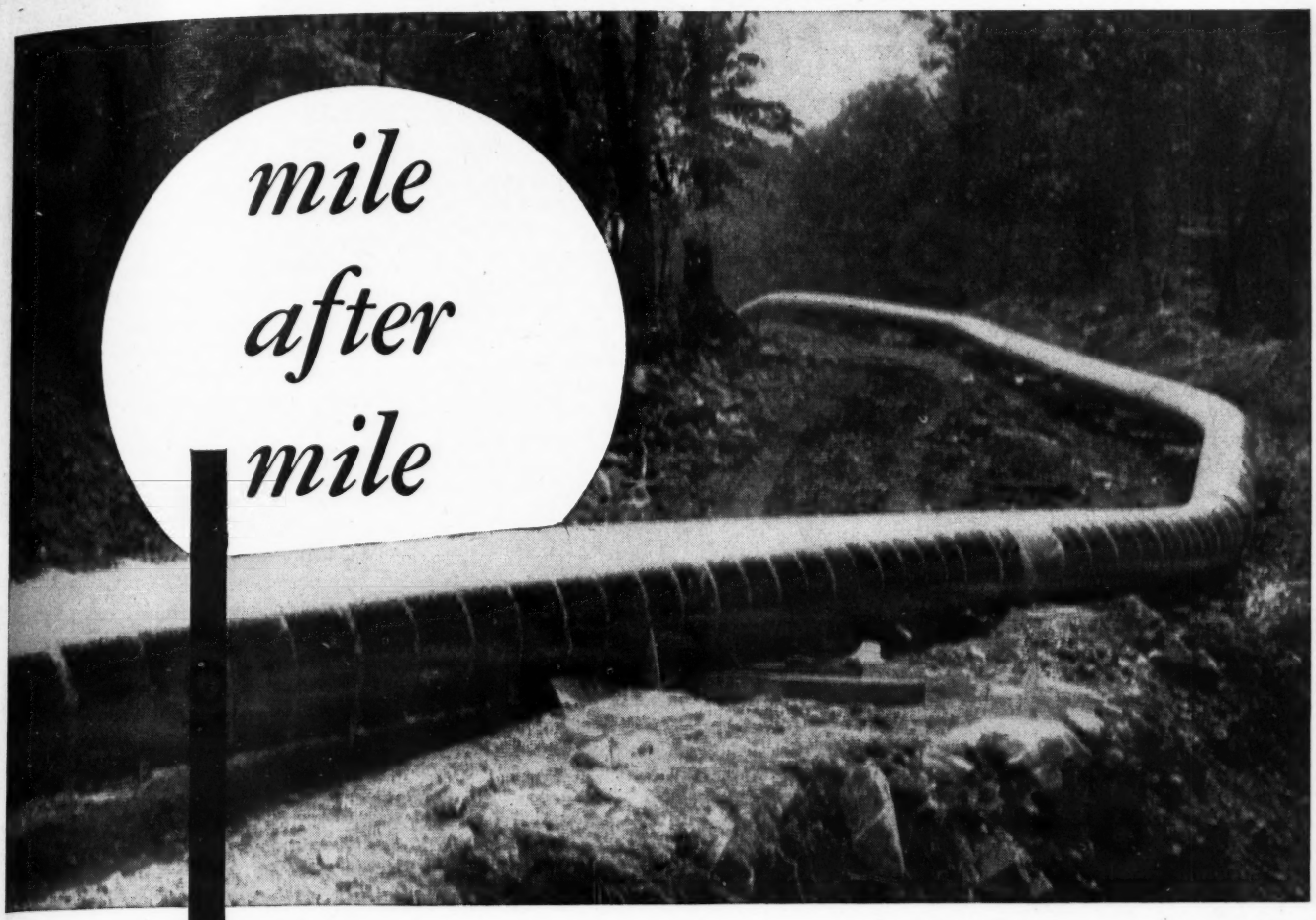
The third 26-in. line location was similar. Pits located ultrasonically and marked on the pipe were found where marked. Pit depths scaled from the photographic records agreed within 0.01 to 0.02 in. of the measured values. *Fig. 4* shows a B-scan made on the pipe at this location. *Fig. 5* is a photograph of the inside of the same piece of pipe, with the pits corresponding to those in *Fig. 4* identified.

The last section of 26-in. pipe examined was not corroded as badly as the other sections but the ultrasonic inspection disclosed at many points a strong reflection from within the pipe wall which was identified as a lamination. Pieces were cut out and etched and an open seam or lamination could be seen. The ultrasonic B-scan of this lamination is shown in *Fig. 6*, the etched specimen from the same area is shown in *Fig. 7*.

A brief inspection was also made on the side of a vertical gas scrubber. The scanner is shown on the side of the scrubber in *Fig. 8*. No corrosion was observed but a lamination in the plate was detected.

It is our belief that this ultrasonic equipment provides a practical and accurate means for locating and measuring corroded areas inside a pipeline and for discovering defects in the pipe wall. Because of its narrow ultrasonic beam, pits can be detected and their depth measured. An important problem in the perfecting of it will be the development of a method for rapidly scanning the surface of the pipe so that the narrow beam does not miss corroded areas, and for assimilating the mass of information produced by such a complete and rapid scan.

This article has been adapted from a talk presented at the PCGA gas supply and transmission conference in Santa Barbara, Calif., May 13-14.



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PIPELINE NEWS

FPC conditionally approves Gulf Interstate pipeline

In a move to ease impending shortages of winter peak gas in the sprawling Columbia Gas System service area, FPC has reluctantly placed its stamp of approval on the Gulf Interstate Gas Co. plan for transporting some 300 MMcf per day of Louisiana gas for distribution throughout the Columbia "groups."

The unique plan, by virtue of which Gulf will be operating as a mere carrier for United Fuel Gas Co., a Charleston (W. Va.) subsidiary of Columbia, received authorization that was hedged about with several highly pertinent restrictions. The commission ruled that:

1. United Fuel and any other Columbia company requiring additional facilities for receiving the gas must file for a certificate for such facilities within 45 days.

2. Gulf must file a financing plan "with firm commitments" within 30 days.

3. Gulf must file an appropriate tariff based on a depreciation rate not to exceed 3½% and a rate of return of not more than 6%, and including a provision for crediting income tax accruals against working capital as well as a specified formula for crediting to United Fuel the value of hydrocarbons extracted from the gas.

4. Deliveries will not exceed 109.5 billion ft annually.

5. Facilities must be completed and in operation within 20 months.

6. The certificate cannot be transferred.

As approved, the line will extend from Rayne, La., to a connection with United Fuel's system in Boyd county, Ky., near Huntington, W. Va., a distance of 860 miles. Costing $129,541,000, the facilities will include 30-in. pipe and five compressor stations aggregating 40,000 hp, giving the line an initial peak capacity of 375 MMcf per day. This will ultimately be raised to 565 MMcf with the building of five compressor stations and additions to the initial group.

Two main supply laterals are also provided—a 78-mile line to the East Mud lake gas field and a 114-mile line to Houma Junction—as are two minor laterals—a 23-mile extension off the west lateral and a 14-mile line from the east lateral to the Erath gas field—plus 84.5 miles of gathering lines.

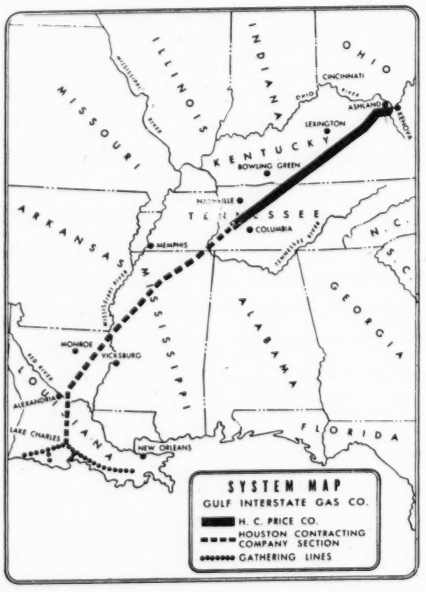
The arrangement between Gulf and United Fuel is the first of its kind and as such brought up some unique problems. One of the more obvious was the loss of gas in passing through the line—by usage for compressor fuel, accidental loss, and unaccounted-for—which must be credited to United Fuel's account. Then there was the necessity that United Fuel make a showing as to how it intended to make use of the gas; although the record mentioned the expenditure of $27,685,000 for facilities to take the gas, no formal application giving construction details had been presented.

A third stickler was the question of depreciation charge to be used in deriving the rate of return (6% maximum) to be allowed. The 4% depreciation asked by Gulf made no allowance for salvage, the commission found, and was based on the theory that the "age-life of reserves under contract to United Fuel Gas is approximately 22 years." But since the source of supply is "in the heart of one of the nation's largest gas-producing areas," and United is still negotiating for gas supplies from the area, "it is not reasonable to assume that the life of the project will be as short as Gulf claims."

A fourth unusual proposition was the provision in the contract that Gulf may extract, or contract with a third party to extract, certain hydrocarbons from United Fuel's gas. Resulting credits to United are provided but, said the commission, "in indefinite terms." The commission held that "any extraction of hydrocarbons that does not reflect in the cost of service the full value of any reduction in Btu content is not in the public interest."

But FPC's principal cause for concern was the high cost of the gas as delivered at the terminal of the Gulf line, the majority gloomily finding that despite the costs, "the requirements for natural gas in the area to be served . . . justify the conclusion that a certificate should issue . . ."

Outgoing Chairman Thomas Buchanan, concurring, acidly remarked that "the Columbia Gas System presents the fervent plea that it is doing its utmost to obtain a gas supply at the lowest possible costs to its customers . . . The records and facts seem to flatly contradict that claim. This record reflects one of the highest (if not the highest) costs of southwestern gas (38.48 cents per Mcf) delivered to Columbia in the Appalachian area."



Although several restrictions still had to be met before final FPC clearance could be given, Gulf Interstate last month was poised to begin construction of its 860-mile line from southern Louisiana to northern Kentucky. H. C. Price Co. and Houston Contracting Co. are splitting the contract as indicated on the map. Completion is set for Nov. 1, 1954.

The high cost of delivered gas has its roots in the purchase prices, which range from 16 to 20 cents, averaging approximately 17 cents at start of operations. An average of 100 MMcf is to be bought at Erath for an initial price of 20 cents, which increases by 2 mills per year until at the end of 24 years it has reached 24 cents. Other prices start at 16 cents, with increases running 4 mills per year. Subsequent reserves findings under the contracts may boost them an additional half-cent to one cent.

Transportation costs will approximate 21.48 cents, giving an initial delivered cost of 38.48 cents per Mcf. Since the record shows that "the present average cost of southwest gas delivered to the various Columbia companies on an approximately 100% load factor basis is 24.7%, (and) rates of pipeline companies that supply gas to the Columbia system (may be) increased in accordance with presently pending rate increase proposals (to) 28.9 cents . . . the increase in the cost of Gulf Interstate gas . . . related to the volume of total sales amounts to slightly more than 2 cents per Mcf."

FPC also pointed out that, according to the record, "these (Columbia) companies do not intend to pool the costs incident to the receipt of the highest priced gas from the facilities of Gulf Interstate into the pooled supply. The average increase of 2 cents per Mcf to Columbia companies . . . does not give a true indication of the increased cost that may be experienced by certain of the companies . . . (They) have not shown what added facilities and what further costs will be required to transport the increased volumes . . .

"We do not regard the probable increases in cost to the consuming public as the only disadvantage inherent in the higher price levels which United Fuel Gas proposes to pay for the gas it will purchase. We must recognize the fact that the payment of higher prices for purchased gas in the circumstances here presented may serve to increase the prices which must be paid for gas by other pipeline companies which are dependent for their gas supplies under existing contracts for the purchase of gas in the same general area where United Fuel Gas will buy the gas which Gulf Interstate will transport for it.

"The question is a serious one and the record in this case does not show to what extent the unusually high price to be paid by United Fuel Gas for natural gas in the field will or may affect the cost of gas to other pipeline companies.

"The record is inadequate to determine or

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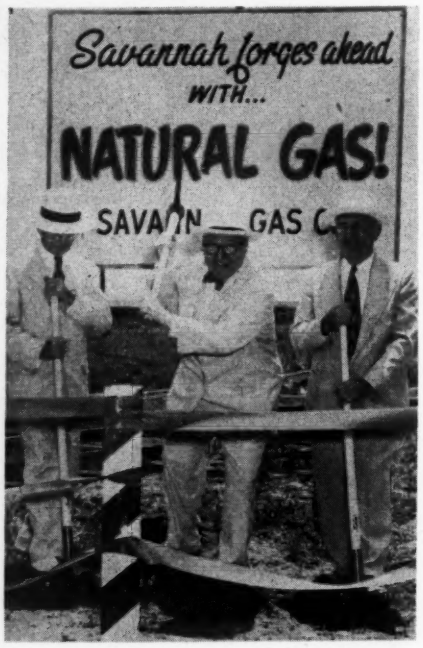
appraise the impact of gas purchased at that level upon other pipeline companies and upon the Columbia system companies. However, the requirements for natural gas in the area to be served through the proposed facilities involved in this docket justify the conclusion that a certificate should issue upon the terms and conditions which we find are required by public convenience and necessity as herein provided."



South Atlantic's President Hansell Hillyer (center) gets official help in ground breaking from Judge Arthur W. Solomon (left), a Chatham county, Ga. commissioner, and Mayor Olin F. Fulmer of Savannah.

Ground breaking climaxes eight-year fight for gas

With the mayor and a county commissioner assisting, and several hundred civic leaders looking on, Hansell Hillyer, president of South Atlantic Gas Co., Savannah, broke ground last month for the pipeline which will begin delivering natural gas to Savannah in October. It was proclaimed as the "end of an eight-year crusade" and "the climax of Mr. Hillyer's pipe dream."

The happy ending of the eight years of planning and negotiation began to shape up May 4 when FPC approved Southern Natural Gas Co.'s application to extend its pipeline to Savannah. Southern is building from Bass station, just east of Macon, Ga. to a connection with South Atlantic's 3-mile line at the Savannah city gate.

The new line and other necessary installations will cost over $1 million, all of which will be spent before the end of this year. Latex Construction Co. of Georgia, contractor for the South Atlantic line, is also the principal contractor for Southern from Macon to Savannah.

Liquids sale bolsters case for Pacific; Gueffroy speaks

Two new developments—one a new factor calculated to brighten considerably the financial outlook for Pacific Northwest Pipeline Corp., the other a strong pro-Westcoast Transmission Co. stand taken by the previously reticent C. H. Gueffroy of Portland Gas & Coke Co.—overshadowed last month's FPC hearings in the battle to serve the Pacific Northwest.

Mr. Gueffroy's emergence from the background in the case was marked by language as bold as any used by his erstwhile "collaborator," but present critic, N. Henry Gellert, president of Seattle Gas Co. Said Mr. Gueffroy of several of Mr. Gellert's recent remarks before a May meeting of the New York Society of Security Analysts (*GAS*, June, p. 114), "Blatant nonsense!"

Mr. Gueffroy, who in his speech before the same group June 10 was supporting his recent stand favoring Westcoast, condemned the Pacific Northwest plan chiefly on grounds of economics—a matter which Pacific Northwest had only two days before sought to strengthen. The company announced it had signed a $150 million contract with Robert E. Maloney, president of Specialty Gas Products, San Francisco, whereby Specialty would purchase the total liquid by-products to be extracted near Durango, Colo., from Pacific's proven reserves in the San Juan basin.

Under terms of the contract, Specialty expects to buy over a period of 20 years liquid products of such a value as to net back to Pacific $150 million, $6 million more than the estimated cost of building the entire project—gathering system, 1400-mile pipeline, processing plant, and all.

According to the company, geologists have estimated that more than 3 billion gals. of hydrocarbon products, including propane, butane, and natural gasoline, can be produced from the more than 3 trillion cu ft of wet gas claimed as proven reserves by Pacific.

Calor Gas Co., serving L. P. gas in 11 western states, would distribute the products. Mr. Maloney is also president of that company.

This development, announced just two days before Mr. Gueffroy spoke, did not calm his fears with regard to the feasibility of the Pacific line. Said he:

"The project's (Pacific's) combination of the production and transmission of gas and the substantial measure of its dependence for financial feasibility on the contemplated recovery and sale of a large volume of by-products, the revenue from which is estimated to be greater than the estimated net income of the project, gives us great concern. Moreover, there is this important unanswered question: If and when the production phase of the business becomes highly profitable, what is there to stop Pacific Northwest from divorcing that part of the business from its pipeline transmission, as has been done by a number of companies and is now in the process of being accomplished by Northern Natural? As the project is now set up, the proposed delivered price of the gas is being subsidized by the production operations, which is probably being done because the promoters cannot be certain of the market for by-products or the cost of drilling further wells, the number of dry holes, etc. Our own studies indicate that the cost of gas from this New Mexico source could easily be 10 cents per Mcf higher than suggested by Pacific Northwest estimates."

Westcoast, on the other hand, "has firm gas purchase contracts and knows exactly what its gas will cost," he said. "Incidentally, the Canadian producers have agreed to sell their gas as low as 5 cents per Mcf at the outset in order to make their contribution to a proper delivered price to distributors."

Mr. Gueffroy's most biting phrases were directed toward Mr. Gellert's expressed fears that, as "foreigners to Canada," distributing utilities taking Canadian gas would be in danger of becoming "economic vassals of a foreign power."

"Now that, my dear friends, is tripe," said Mr. Gueffroy. "Tripe, pure and undefiled."

"Are we economic vassals of Canada because we are dependent upon that thriving young nation for 90% of our nickel, for 75% of our wood pulp, for 80% of our newsprint? Are we Canada's economic and military serfs because Canada provides such a large part of the basic raw materials with which we are producing the atomic armament relied upon to defend the free world?"

Mr. Gueffroy wondered why his opposite number in Seattle was finding burglars under the bed where he had not found them 18 months before. "In October and November of 1951 . . . Mr. Gellert was mouth-wateringly eager to become an 'economic vassal' of this threatening 'foreign power.' On Nov. 3, 1951, Mr. Gellert and I executed . . . detailed contracts with Northwest Natural Gas Co. for the purchase of a supply of gas from the Pincher Creek field in southern Alberta. These contracts could not be carried out because the Northwest Natural people were unable to obtain an export license . . .

". . . But Henry has changed . . . months *after* he had committed himself to the Pacific Northwest pipeline and San Juan gas (he) announces that *he* has engaged Commonwealth Services Inc. to make a 'truly objective' study of the situation.

"At least it must be said that my associates and I engaged competent experts and had the benefit of their reports *before* we arrived at our conclusions." Here Mr. Gueffroy was referring to the so-called Bechtel report (*GAS*, May, p. 150) about which Mr. Gellert had said, "We are not convinced (it) is either impartial or objective."

"In heaven's name!" cried Mr. Gueffroy, "what could we possibly accomplish by spending our money for studies that are not impartial or objective?"

Mr. Gueffroy felt that Mr. Gellert had little grounds for questioning Portland Gas

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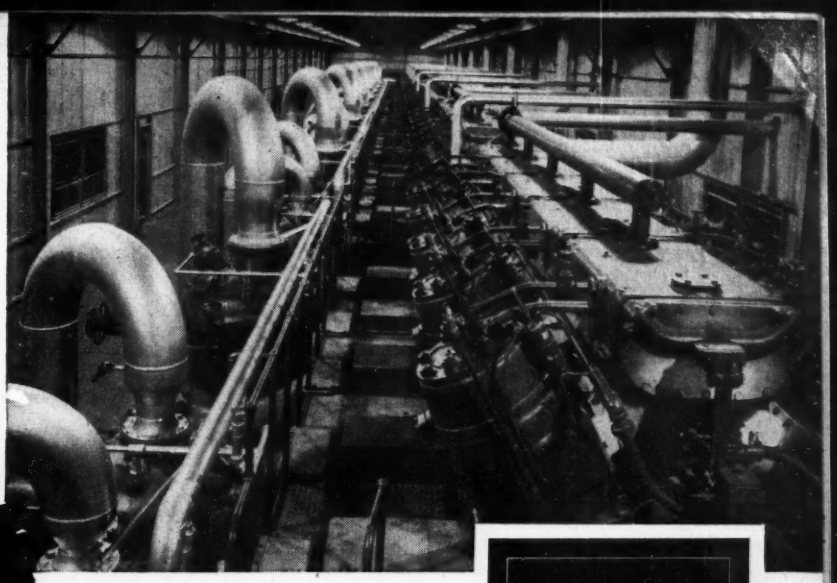

This compressor line-up in the Fuller plant now consists of 880 hp GMV-8-TF units and 1100 hp GMV-10-TF units. Each unit is equipped with a high pressure cylinder for injection service.

These Cooper-Bessemer turboflow, spark-ignited four cycle gas engines drive 500 K.W. generators to provide electric power for the operation of all pumps, air compressors and similar equipment.

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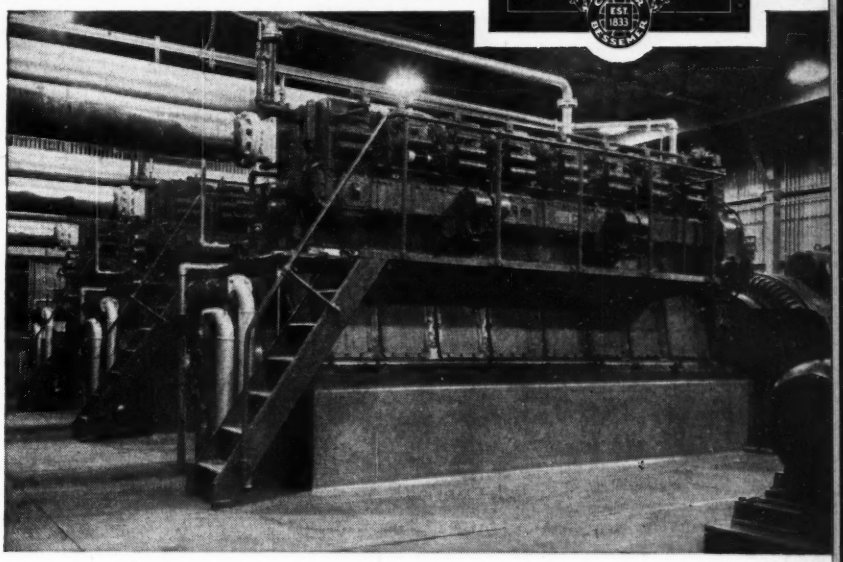

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Co.'s open-mindedness. "The fact is that he announced his support of Pacific Northwest Pipeline Corp.'s project more than a year ago, when no one had the faintest idea what the gas would cost, and he has blindly supported (it) since that time, although the project as presently contemplated has been radically changed from the plans of a year ago," Mr. Gueffroy charged.

"By way of contrast . . . our own decision to support . . . Westcoast . . . was not reached until our engineers and analysts had an opportunity to examine the hundreds of exhibits and more than 8000 pages of testimony."

Convinced that there are no real dangers inherent in the import situation, Mr. Gueffroy makes his choice on the basis of economics. The map (see pipeline cover) which he introduced to the analysts purports to show saturation and markets in the Northwest as compared to the East Coast. Westcoast's proposed system is inverted and superimposed on a map of the eastern seaboard, with the source of gas, near Dawson Creek, B. C., falling near Asheville, N. C. Said Mr. Gueffroy, by way of explanation:

"The combined population of the states of Oregon and Washington and the province of British Columbia is 6,065,000. By comparison, the population of the metropolitan area of New York City and northeastern New Jersey alone totals over 12,900,000, and the combined population of the metropolitan areas of Boston and Philadelphia is over 6 million.

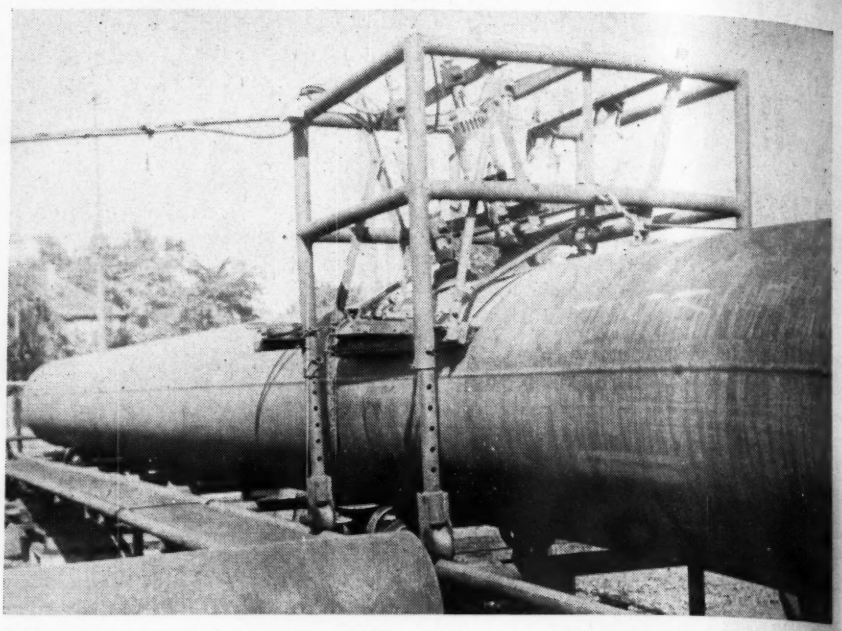
"At the end of the fifth year of natural gas operation in the Pacific Northwest area it is estimated that there will be 350,000 gas customers. By comparison, there are now approximately 2,400,000 gas customers in the Boroughs of New York City alone.

"The low density of population to be served by the natural gas network in the Pacific Northwest and the necessity of selling large volumes of gas at a high load factor in order to have reasonable gas transportation and distribution costs readily demonstrates the necessity for low rates which will permit large volumes of gas to be sold for industrial use. Without such rates and corresponding industrial sales, a natural gas project designed to serve the Pacific Northwest cannot be built."

Court challenge of OPS ceilings held meaningless

The fact that price controls on natural gas had previously been lifted by the Office of Price Stabilization rendered meaningless a suit against the bureau, it was decided last month in the U. S. Emergency Court of Appeals in Washington.

The suit had been brought last January by Stanolind Oil & Gas Co. and Continental Oil Co. to appeal a 10-cent rate ceiling fixed by OPS for the Woodlawn (Texas) field. Subsequent removal of ceilings failed to deter the companies from seeking a court decision on the matter.



MichCon's improvised brushing machine used to clean 60,000 ft of 30-in. steel pipe.

MichCon's machine cleans 40 ft of pipe in 3 minutes

Faced with an unusual condition—the need for a quick cleaning job on 60,000 ft of 30-in. steel pipe that had rusted badly in storage—Michigan Consolidated Gas Co., Detroit, devised a brushing machine that would completely clean a 40-ft length of pipe in from three to 10 minutes.

Five wire brushes mounted on a fixture moving along a track permitted the mechanization of a hand job that would have been tedious and agonizingly slow. Not only would a minimum of 20 men using hand brushing techniques have been required to do the job at the speed required, but some portions of the pipe were so badly rusted that no amount of hand work would have made them ready for the priming and coating operations.

While it was devised primarily for cleaning, the machine was also adapted for the priming job on the same pipe.

MichCon's operating personnel, experimenting with a 6-in. wire cup brush on a 4000-rpm Thor grinder, found that a satisfactory result could be obtained by operating the brush in a vertical position with the cupped surface on the pipe. It was difficult, however, for an operator to control the machine; so a fixture was devised which would hold five brushes grouped in such a manner as to completely cover an 18-in. band of pipe. A long wire brush was also clamped onto the fixture, and held against the pipe with spring tension to produce a wiping action for removal of dust and loose particles.

The fixture was mounted on a track and pulled along the pipe with a hand winch, which enabled it to be moved at a slow, uniform rate of travel. As the fixture moved along its length, the pipe was turned by a power-driven dolly. Speed with which the fixture was moved varied with pipe condition, from a minimum of three minutes for a 40-ft section to 10 minutes.

The priming fixture mounted a paint can and rollers for applying the primer and was set to move on the same track so that the pipe could be primed without being moved off the dolly.

While they were only improvisations, the fixtures operated satisfactorily and enabled MichCon to keep a supply of pipe flowing to meet its construction schedule.

Amend common carrier rule to follow court verdict

The common carrier problem of natural gas transmission companies was formally swept into the limbo late in May when Secretary of the Interior McKay reinstated the old regulations under the Mineral Leasing Act and announced that no appeal would be filed to the recent court of appeals ruling (see *GAS*, May 1953, p. 146).

For the duration of this administration, at least, El Paso Natural Gas Co. and any other company operating under common carrier status—that is, whose lines cross public lands—are released from the burdensome requirements imposed by regulations drawn up by former Secretary of the Interior Oscar Chapman July 27, 1951.

The formal amendment reads: "Section 244.63 is repealed and Section 244.62 is amended to read as follows . . . Common carrier stipulation: oil or gas pipelines. Each applicant for an oil or gas pipeline right-of-way must include the following stipulation: The applicant agrees to operate the pipeline as a common carrier in accordance with the provisions of the Mineral Leasing Act and, within 30 days after the request of the Secretary of the Interior, to file rate schedule and tariff for the transportation of oil or gas, as the case may be, as such common

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carrier with any regulatory agency having jurisdiction over such transportation as the secretary may prescribe."

The requirements that Mr. Chapman had appended to the act placed specific restrictions upon operation as well as construction of lines such as those built by El Paso Natural for transportation of gas from Texas to California.

Race to serve east Canada narrowed to two contestants

The race to pipe Alberta gas to eastern Canada (See June *GAS*, p. 114) narrowed to two contestants last month, Trans-Canada Pipe Line Co. with its 2200-mile all-Canada plan and Western Pipelines Ltd. proposing to transport Pincher creek gas to the east with a line for export to Minneapolis-St. Paul.

The race was narrowed to the two contestants when Alberta Natural Gas Co. Ltd., a Northwest Natural Gas Co. subsidiary, withdrew its application to the Petroleum and Natural Gas Conservation Board. A possible fourth contender—Midcontinent Pipe Line Co.—will not have its application heard at the current hearings. It proposes the southern route to Ontario and Quebec paralleling the Interprovincial oil line.

Counsel for Trans-Canada had raised strong objections against the consideration of applications by Western Pipelines and the Northwest Natural subsidiary on the ground that neither had submitted all pertinent data to the board by the deadline date, May 25. The board took dismissal motion under consideration and the hearings have continued.

Prior to submitting its withdrawal Northwest had also agreed to defer consideration of a second application to export gas to the Pacific Northwest until the FPC ruled on a further application by Westcoast Transmission Co.

Gathering tax case to be taken to Supreme Court

The last round in the court fight over a natural gas gathering tax in Texas will be fought in Washington, where pipeline companies will take their appeal to the U. S. Supreme Court.

This was apparent when the Texas supreme court early in June refused a motion for rehearing in the natural gas test cases.

The outcome of the appeal to the U. S. Supreme Court will decide whether the Texas legislature can spend the million dollars a month income from the tax levied in 1951. More than $15 million already is tied up in the state treasury.

If the state wins, as Gov. Allan Shivers predicts, he plans to call a special session of the legislature to spend the money for new state buildings and pay hikes for state employees.

In refusing a motion for rehearing based on the plea of the pipeline companies that the state courts previously had failed to declare that the tax violated the interstate commerce clause of the U. S. Constitution, the Texas supreme court did not change its original decision upholding validity of the tax.

An Austin district judge in 1952 declared the tax valid, but in February this year, the Austin court of civil appeals overruled the trial judge.

The gathering tax fixed by the legislature is 9/20ths of 1 cent per thousand cu ft. If the levy is finally upheld, some Texas legislators predict the rate will be raised at the next session to meet demands for money. Other gas producing states might be tempted to follow the Texas example.

Failure of numerous gas tax bills to get through the 53rd Texas legislature this year was due partially to a "wait and see" attitude of legislators regarding the disputed gathering tax bill.

Better price sought for gas from state-owned land

The Louisiana Mineral Board has been advised to make an all-out effort to see that the state is better compensated for gas taken from the state-owned lands.

Investigation by Edwin F. Hunter, member of the state mineral board, has shown that Louisiana is receiving considerably lower prices for its gas than are private concerns.

On more than 20 of its leases the prices go as low as 4 cents per Mcf with an average of 7 cents on some 40 leases, while the average price in the midcontinent fields is 9 cents—going as high as 20 cents in some cases.

"I do not like to appear facetious," stated Mr. Hunter after these facts, "but it would appear that the gas on the leases owned by the state (Louisiana) must indeed be of very poor quality."

Under a 1948 act of the legislature the state may levy a high tax where payments to royalty owners are below that received by the gas producer.

Mr. Hunter said he intends to look further into the matter and will confer with the lease holders individually to determine the facts in each case.

Kansas royalty owners granted price increase

What amounts to a 10% increase in price for the southwestern Kansas royalty owners has been granted by the Kansas Corporation Commission. The actual grant is for a change in the pressure base on which contracts are written, from 16.4 to 14.65 psi, effective July 1.

The royalty owners applied to the commission at the same time for a boost in the present minimum wellhead price of 8 cents. They ask that the minimum be set at 14 cents for gas delivered at 16.4 and 12 cents when measured at 14.65 psi. This is still under consideration by the commission.

Grounds for the pressure base change and rate hike used by the royalty owners were that such moves are necessary in order to conserve "an irreplaceable natural resource."

Further Northern Natural hearings consolidated

The Federal Power Commission was to have begun combined hearings June 23 on all remaining matters involved in an application by Northern Natural Gas Co., Omaha, for construction of pipeline facilities and on Northern's application involving transportation of an additional 40 MMcf of gas. (See May *GAS*, p. 150). The commission, however, denied an application by the National Coal Assn., United Mine Workers of America, Fuels Research Council Inc., and Chesapeake & Ohio Railway for a rehearing of its order of May 1 authorizing Northern, Permian Basin Pipeline Co., and El Paso Natural Gas Co. to construct facilities to transport 300 MMcf of gas per day to Midwest customers.

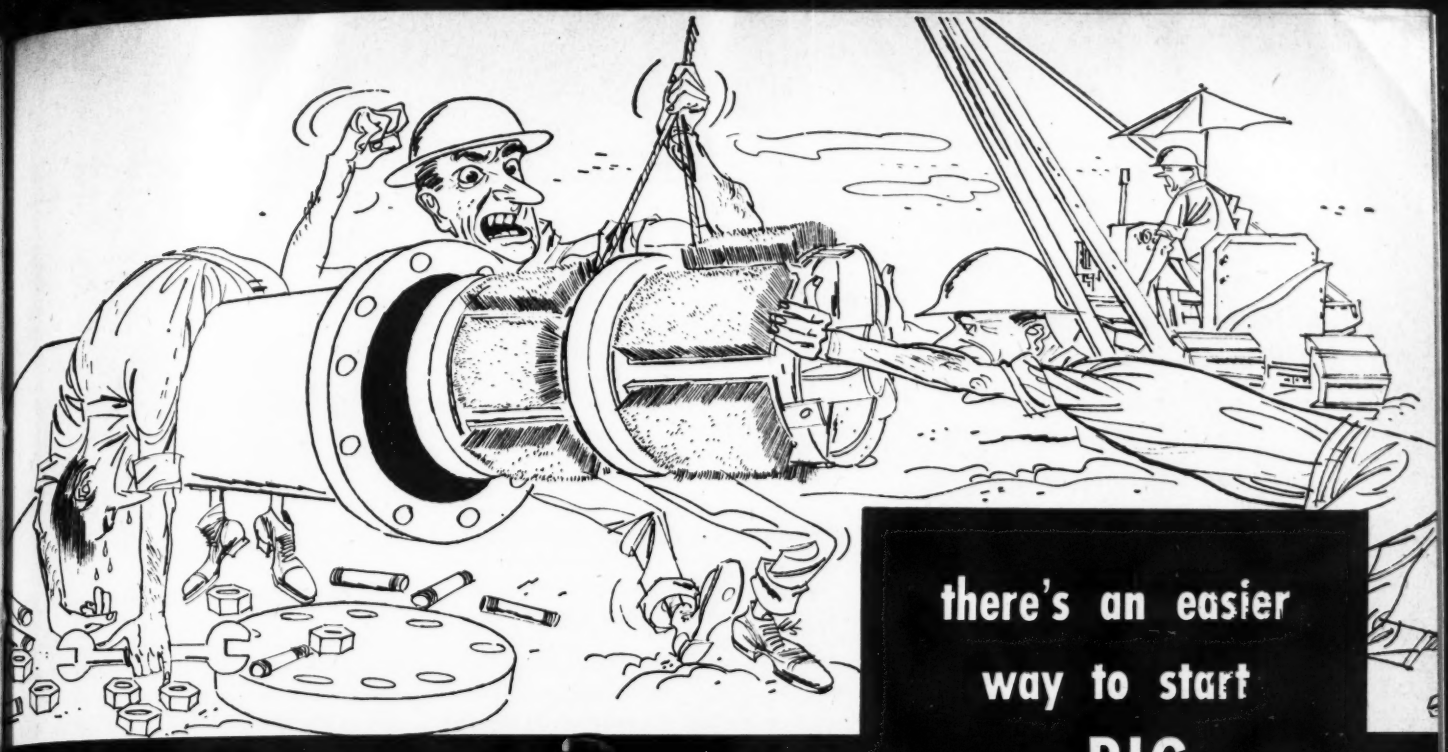
In its May 1 order FPC authorized only the first year's construction as planned by Northern. Branch lines to new communities, town border stations and other facilities to be constructed in the second year are being considered in the current hearings. This program includes 204 miles of mainline loop and branch lines and further additions totaling 22,800 hp to five compressor stations at an estimated cost of $22,643,000.

Stop-flaring order delayed again for Rangely field

The Colorado state oil and gas conservation commission has granted a two-month delay—the fourth since Jan. 1—in its order compelling oil operators to repressurize the Rangely field by injection of casinghead gas which is now being flared. It was to have been effective July 1. The authority of the commission to order operators to stop flaring was upheld by District Judge Robert W. Steele late in May as the result of a suit challenging the order.

The order is an attempt to eliminate waste in the field, the sixth largest producing field in the nation last year. It is expected that repressurization will increase eventual recovery from the reservoir by 80 million bbls of oil valued at $200 million and add $4 million to state tax revenues.

The original order issued in June 1952, effective Jan. 1, 1953, was contested by the Texas Co., Sharples Oil Corp., and Union Pacific Railroad. The plaintiffs charged the commission with "exceeding its authority" and termed the injection program "impractical and unworkable." The Phillips Petroleum Co., California Co., and Stanolind Oil & Gas Co., representing 75% of the operators in the field, later intervened in the case.



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An oversize barrel on the sending and receiving ends of a line, slightly larger than the diameter of the pig, makes it easy to send or catch a scraper. Line pressure does the heavy work. But to make the job doubly simple and easy, you need UNIBOLT Hinged Scraper Traps. To open them, all you need do is release two bolts and the blanking plug swings open like a door. No heavy lifting. Nothing to fall on workmen. No time-consuming blind flanges to break out and make up. No danger of leaks. A self-sealing resilient ring assures a pressure-tight closure.

Wherever multi-bolt flanged couplings and closures are now being used . . . on strainers, scrubbers, mist removers, terminal manifolds, blowdowns or other pressure vessels . . . UNIBOLT Couplings will serve you better.

THORNHILL-CRAVER COMPANY • P. O. BOX 1184 • HOUSTON, TEXAS

in behalf of the commission. It is expected that an appeal will be made to the supreme court to set aside Judge Steele's ruling. Meanwhile, flaring continues daily, consuming millions of cubic feet of gas.

Supreme court voids order closing Spraberry field

The Texas supreme court last month declared void the Railroad Commission's order closing the 2200 wells in the Spraberry oil field to prevent waste of gas by flaring. The court said, "It may be that through use of administrative devices not available to the courts the commission can work out its own solution preventing further waste of gas and protecting correlative rights."

Two pipeline expansion projects are under way, and the commission has been told that by next year all Spraberry gas will be going to useful outlets.

At press time Commissioner William J. Murray Jr. was considering a motion for rehearing which could be made within 15 days after the order.

Texas A&I honors gasmen during 8th short course

At the opening night banquet at the eighth annual short course in gas technology at Texas A & I College, Dr. E. H. Poteet, A&I president, presented certificates of appreciation to six men in the gas industry for their service to the industry and work in the development of the course, which is sponsored by the Southern Gas Assn.

Technical developments in the industry were brought out by lectures and discussions in both classrooms and on field and inspection trips. Only those who have adequate engineering background in the technical problems of production, etc., of natural gas are eligible for this short course which is the only accredited course of its type offered in the south.

A barbecue given by the natural gas industry committee at Humble Oil Co.'s Stratton camp on the King ranch concluded the session.

Sufficient oil tubular goods predicted for 1953

Barring disruptions of production, there will be sufficient oil tubular goods to drill the 45,000 to 50,000 wells the oil industry expects to complete in 1953, according to United States Steel Corp. officials.

About 30% more pipe and tube will be available from domestic mills than last year, with the total expected to be about 5.8 million tons. This does not include the rest of the oil equipment and other essentials which should bring the total production for the oil industry alone to 13.8 million tons, an increase of 65% since the end of World War II.

Notes

Willard W. Gatchell, a member of the FPC legal staff since 1931, has been appointed FPC general counsel, succeeding Bradford Ross. Mr. Ross resigned as of May 30 to open a law office in Washington, D. C., with Bernard Foster, who was assistant general counsel of the commission in charge of gas matters before his resignation on the same date.

Natural gas prices in the Texas Panhandle field have increased from .069 to .075 cents per Mcf in the past year, according to the state railroad commission. Sour gas averages about ½ cent less (to allow for the cost of desulfurizing).

The California Public Utilities Commission has authorized the plans of the Southern California Gas Co. to build an additional 73 miles of line and facilities from its present station in Blythe to Sante Fe Springs, Calif. This would bring an additional 151.7 MMcf of gas into southern California from Texas. The project, estimated at $7.5 million, is still awaiting FPC approval.

Kerr-McGee Industries Inc., Oklahoma City, recently began operation of its new $850,000 natural gas plant one mile east of Etter, Moore county, Texas. The plant is processing 45 MMcf of gas a day and will be stepped up to 60 MMcf. Gas for processing comes from wells in Moore and Sherman counties, many of which are company-owned.

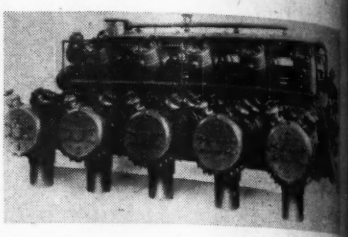
Cities Service Oil Co. has under consideration a $3.9 million natural gasoline plant two miles north of Blackwell, Okla. It will have a capacity of 200,000 gals. per day. Products line will be built to the expanded Cities Service refinery at Ponca City.

The FPC has affirmed a decision in which Trunkline Gas Co., Houston, was directed by an order filed by FPC presiding examiner Emery J. Woodall to supply 600 Mcf of natural gas per day each to the towns of Colfax and Boyce, La., who had requested this service. It orders Trunkline to establish connections with the towns, consisting of metering and regulating stations, and to file a service agreement with the FPC. Estimated cost is $15,000 each. The towns will construct connecting laterals and distribution systems.

Construction on a portion of the Permian Basin Pipeline Co. project (see June *GAS,* p. 112) near Hobbs, N. M., has started. Dresser Engineering Co. is starting to work on a compressor station, sulfur removal plant, dehydration plant, and a gasoline plant which will cost approximately $2 million. The R. H. Fulton Co. will construct the necessary gathering lines of 16-, 20-, and 24-in. pipe.

New Products

For additional information on these products use coupon on p. 68.



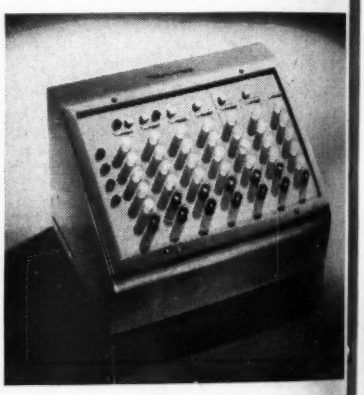
18 New GMVA Compressor

A new engine has been developed by the Cooper-Bessemer Corp. that cuts fuel consumption to as low as 7500 Btu per hp-hr and produces over ⅓ hp more per cu ft of space than has been possible before, according to the manufacturer. It also allows a greater range in compressor operation, permitting the handling of overloads up to 35% with less tendency for detonation than is often experienced in gas-engine compressors.

Called GMVA, the new engine is evolved from the GMV compressor, which has been in service for over 15 years. The GMVA is built with 4, 6, 8, and 10 cylinders, which provide hp capacities from 540 to 1350. The output per cylinder is being developed with 15% less heat load on the engine, and thermal efficiency is higher than in either previous model.

Cooper-Bessemer Corp.

■

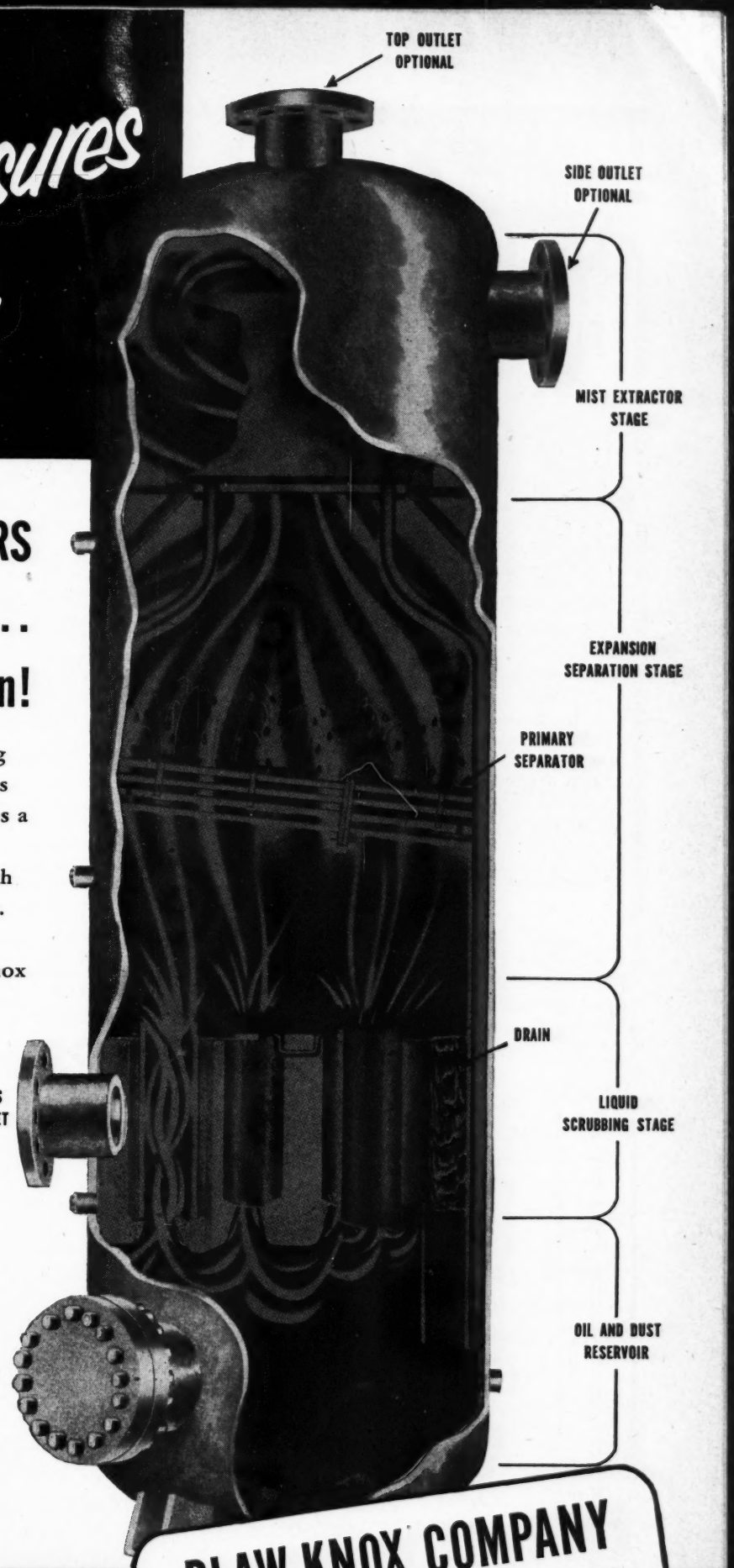


19 Cordless Switchboard

Development of a cordless switchboard to interconnect a telephone system with a mobile two-way radio system, microwave system or power line carrier system has been announced by the Communication and Electronics Division of Motorola Inc. It is a simple, manually operated system of four talking channels and one control channel which can be connected in any number of ways. Several switchboards may be combined for additional lines.

Motorola Inc.

No half-way measures here

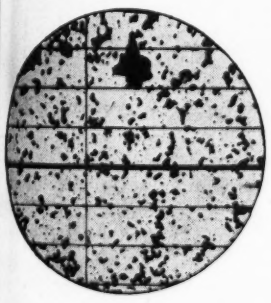


BLAW-KNOX GAS CLEANERS GET ALL SIZES OF DUST...

Down to the smallest micron!

Of all the devices and methods for preventing damaging, abrasive dust from getting into gas mains, only the *oil scrubbing* type cleaner does a truly thorough job—only oil scrubbing gets those microscopic particles that play hob with compressors, valves, meters and pilot orifices. In extensive field tests covering a period of years our engineers have found that Blaw-Knox Gas Cleaners connected to unusually dirty mains showed that the outlet gas contained not more than 0.000005 pounds of dust per 1000 cubic feet! Any gas engineer would call that "really clean gas."

HOW BIG IS A MICRON?



In this photomicrograph at 200 magnifications the narrow lines are one micron wide. Note that many dust particles are even smaller. For complete information on Blaw-Knox Gas Equipment and the subject of pipe line dust, write for Bulletin 2353.

BLAW-KNOX

BLAW-KNOX COMPANY
BLAW-KNOX EQUIPMENT DIVISION
GAS EQUIPMENT DEPARTMENT
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For easy handling of coated pipe!

CROSE ENDLESS PIPE BELT SLINGS

The finest belt sling available for handling coated pipe on lowering-in operations. For pipe sizes from 8" to 36". Conventional type belt slings available for 4" to 36" pipe.

M.J. Crose Manufacturing Co. Inc.

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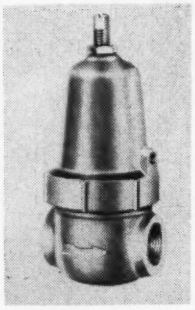
20 Farm Tap Regulator



A new farm tap regulator for high pressure services is being produced by Rockwell Manufacturing Co. Designed to reduce the pressure on high pressure transmission lines to a point where pressures reaching isolated customers can be handled safely by the conventional service regulator, the "118" operates with inlet pressures up to 1000 psi. Interchangeable springs provide four outlet pressure ranges: 5-30 psi, 30-75 psi, 75-300 psi, and 200-400 psi. A special groove in the diaphragm sealing surface retards diaphragm pull at high outlet pressures and affords positive sealing.

Rockwell Manufacturing Co.

Trade Literature

21 Pipeline Equipment Price List

A new 32-page illustrated price list of pipeline equipment material and supplies has been published by M. J. Crose Manufacturing Co. Bulletin 353 gives price schedules on coating and wrapping machines, cleaning and priming machines, road boring machines, welding clamps, line-up clamps, cradles and other important items for the pipeliner.

M. J. Crose Manufacturing Co.

■

22 Meter and Valve Bulletins

Two comprehensive new bulletins have just been issued by Rockwell Manufacturing Co.:

(a) A 28-page, two-color bulletin describes Rockwell "201" orifice meters. Featured are tables giving representative orifice capacities, full-page front and rear view sectional photographs, photo-illustrated descriptions of manifold arrangements and differential ranges available, and pictures and drawings of various elements of the meter to illustrate specific design features.

(b) A 12-page bulletin describes lubricants, lubricant fittings and methods for Nordstrom valves. Rockwell Hypermatic, Nordcoseal, and Lubricant DC-234, three major types of lubricant, are described in detail. A selection chart is included showing recommended lubricants for a variety of fluids. The bulletin also contains detailed, photo-illustrated instructions for servicing all Nordstrom valves.

Rockwell Manufacturing Co.

SLEEVES · CONCRETE RIVER WEIGHTS · PIPE LINE HALF SOLES

COSTS AND PIPE HELD DOWN

One of the many Edwards Concrete River Weights installations on Texas-Illinois Natural Gas Pipeline.

Edwards Split Welding Sleeves also used on the line to insure perfect joints in swamps, rivers and safety zones.

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How do your equipment costs compare?

T-35 Back Hoe

Owning and operating costs:

Initial investment ----$9580.00*
(complete with GMC 6x6)

AVERAGE COST PER HOUR

A. Fixed owner costs-----$1.22
(Depreciation, interest, insurance, taxes, etc.)

B. Operating costs ------$ .50
(oil, gas, grease)

C. Maintenance and repair costs ----------$ .13
(including tires, cable, etc.)

TOTAL----$1.85

*NOTE: Above figures include average costs for both truck and Bantam, based on mounted hoe unit (20" bucket) with cwts., FOB Waverly, Iowa. (Subject to change.)

Chances are your present budget can be cut in half with T-35 Bantams®!

If you've been handling your pipeline work with *big* expensive equipment (or the usual "spread" of trenchers, high-lifts, dozers, etc.), you're in for a real surprise, when you see the *new* Bantam T-35 Back Hoe in action. Because the T-35 not only lets you handle high-speed trenching, pipe placement and backfilling with ONE machine . . . it does *all* these jobs at the *LOWEST net cost PER HOUR in the industry!* (Based on actual owner records—see average hourly costs above).

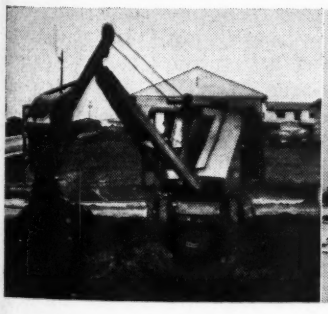
Add to these advantages, the T-35's *new remote* control . . . *fast job-to-job mobility* . . . 8 fast-change attachments . . . and you have a cost-saving combination that can't be equalled for handling emergency leak repairs, miscellaneous pipeline trenching, maintenance chores, compressor station work, etc.

See the T-35 Bantam in action *NOW*. Your nearby Bantam Distributor will gladly demonstrate the T-35's versatility on any job you wish, without obligation. A request on your letterhead will start a Bantam your way in a hurry . . . ACT TODAY!

SB-H-22

SCHIELD Bantam Co.
268 Park St., Waverly, Iowa, U. S. A.

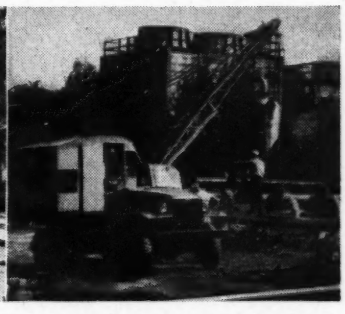
World's largest producer of truck-mounted cranes and excavators



BACK HOE digs over 100' of 5' ditch per hr. with full range of bucket sizes. Cuts clean, straight trench to maximum 14' depth.

CRANE ADAPTOR quickly converts your Back Hoe, for fast unloading and placing of pipe, without changing hoe boom!

BACKFILL BLADE easily attached in 5 to 10 minutes, for fast backfilling. Parallel linkage blade also available for long-run jobs.



6-TON CRANE BOOM (optional 25' to 50' lengths) interchanges with hoe boom on the job, where longer reach is needed.

Pipeline People

Formerly chief statistician for the New York State Natural Gas Corp., WORTHY K. SCOTT JR., Mt. Lebanon, has been appointed rate engineer. Mr. Scott has been with the company since 1942.

T. D. Williamson Inc., Tulsa, has appointed PHILIP H. MOORE of Albany House, Esplanade, Durban, Natal, as sales and service representative for southern Africa. Mr. Moore has been a consulting engineer and agent in Durban since 1950.

Two directors were added to the board of directors at the annual meeting of the Colorado Interstate Gas Co. recently. W. E. MUELLER, executive vice president of the company, and MARK MILLARD, partner of Carl M. Loeb Rhoades & Co., New York, are the new directors.

JACKSON M. BARTON of Tulsa has been named exploration manager of Northern Natural Gas Co. working in the gas supply department in its stepped up search for new reserves. Mr. Barton comes to Northern from the Deep Rock Oil Corp. where he was manager of the geological department.

J. M. Barton
Northern Natural

J. R. Fraser
Texas Eastern

JACK R. FRASER has been appointed chief petroleum engineer for Texas Eastern Production Corp., Houston. He joined the company in 1951 as a district geologist and has recently served as division engineer.

J. D. Davis, district manager of United Gas Pipe Line Co.'s production and transmission properties, Jackson, Miss., has announced the promotions of ROBERT M. HEARIN and R. A. RAYNE. Mr. Hearin now has the position of assistant district manager and Mr. Rayne is his successor as district land man responsible for the acquisition of mineral leases.

H. GORDON CALDER has announced his resignation as president of Southern Production Co. Inc., Shreveport, affiliate of Southern Natural Gas Co. He stated he will continue to act as consultant for the firm an. will retain his position on the board.

JAN OOSTERMEYER, former president of the Shell Chemical Corp., has been elected to the board of directors of the Fluor Corp. Ltd. of Los Angeles.

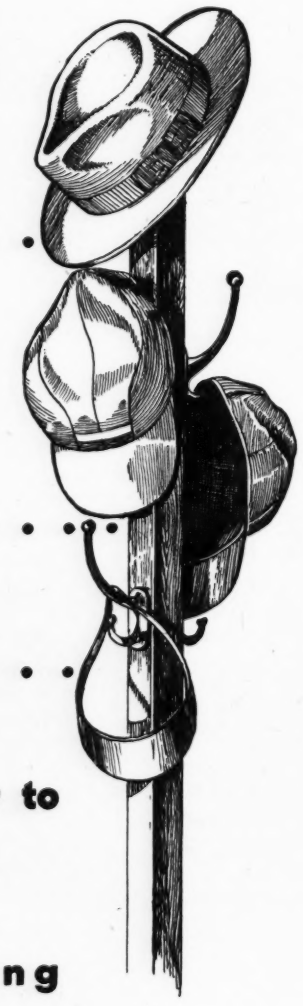
Jan Oostermeyer
Fluor

Todd W. Smith
Cooper-Bessemer

The Cooper-Bessemer Corp., Mount Vernon, Ohio, has appointed TODD W. SMITH to its Seattle, Wash., office to handle the engineering application of heavy internal combustion engines, compressors and pumps in that territory.

Aztec Oil & Gas Co., subsidiary of Southern Union Gas Co., has elected VAN THOMPSON, former manager of the exploration department, to the office of vice president. He will continue to have supervision of the geological exploration, land and lease, production and drilling activities.

Abrams



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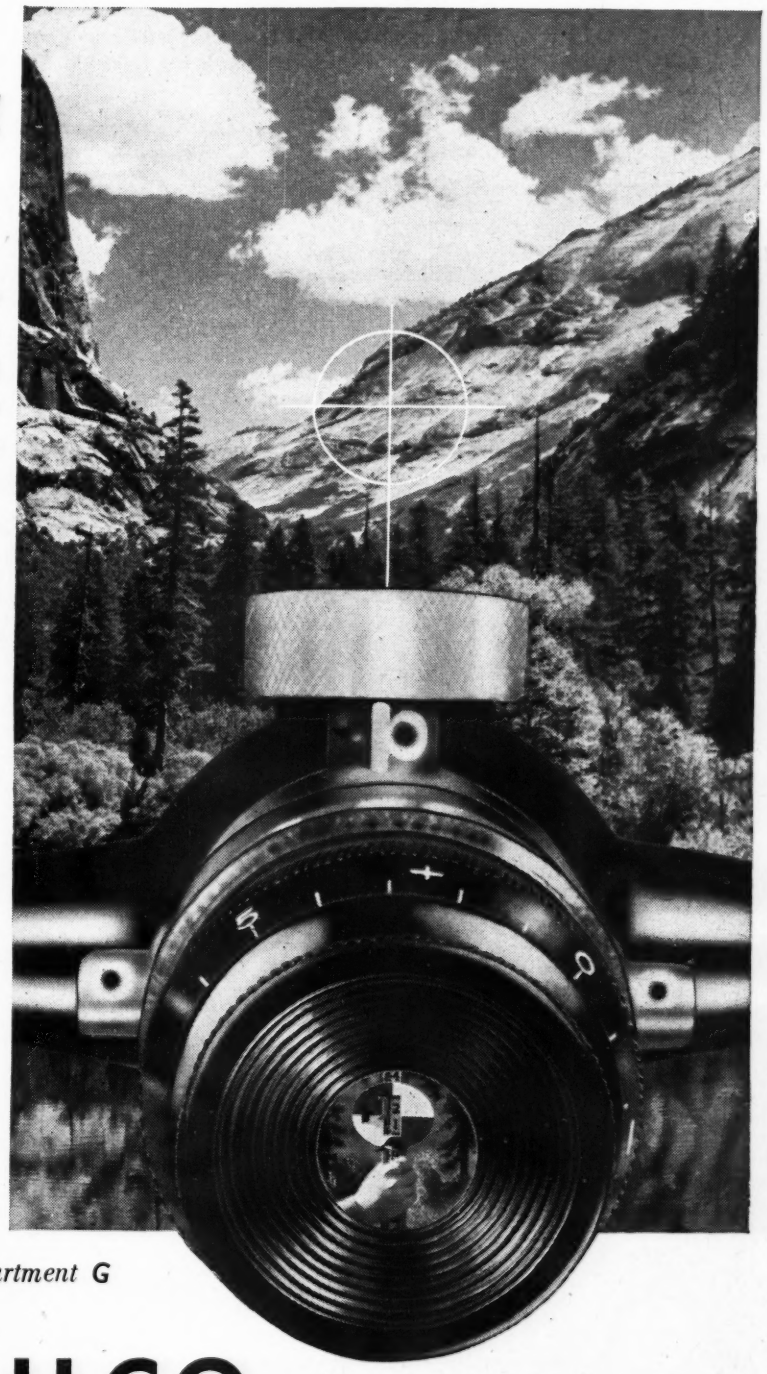
MAP SURVEYS: Philco Engineers, using authoritative maps and control data locate repeater and terminal sites to suit your requirements and give you reliable, economical communications.

FIELD SURVEYS: Philco Field Survey Crews, check all Paper Survey information in the path of your microwave system. Every factor bearing on dependable and economical operation is checked and re-checked to assure you of the finest communications.

AERIAL SURVEYS: Radar, aerial photography, every modern instrument and technique is used in Philco Physical Surveys.



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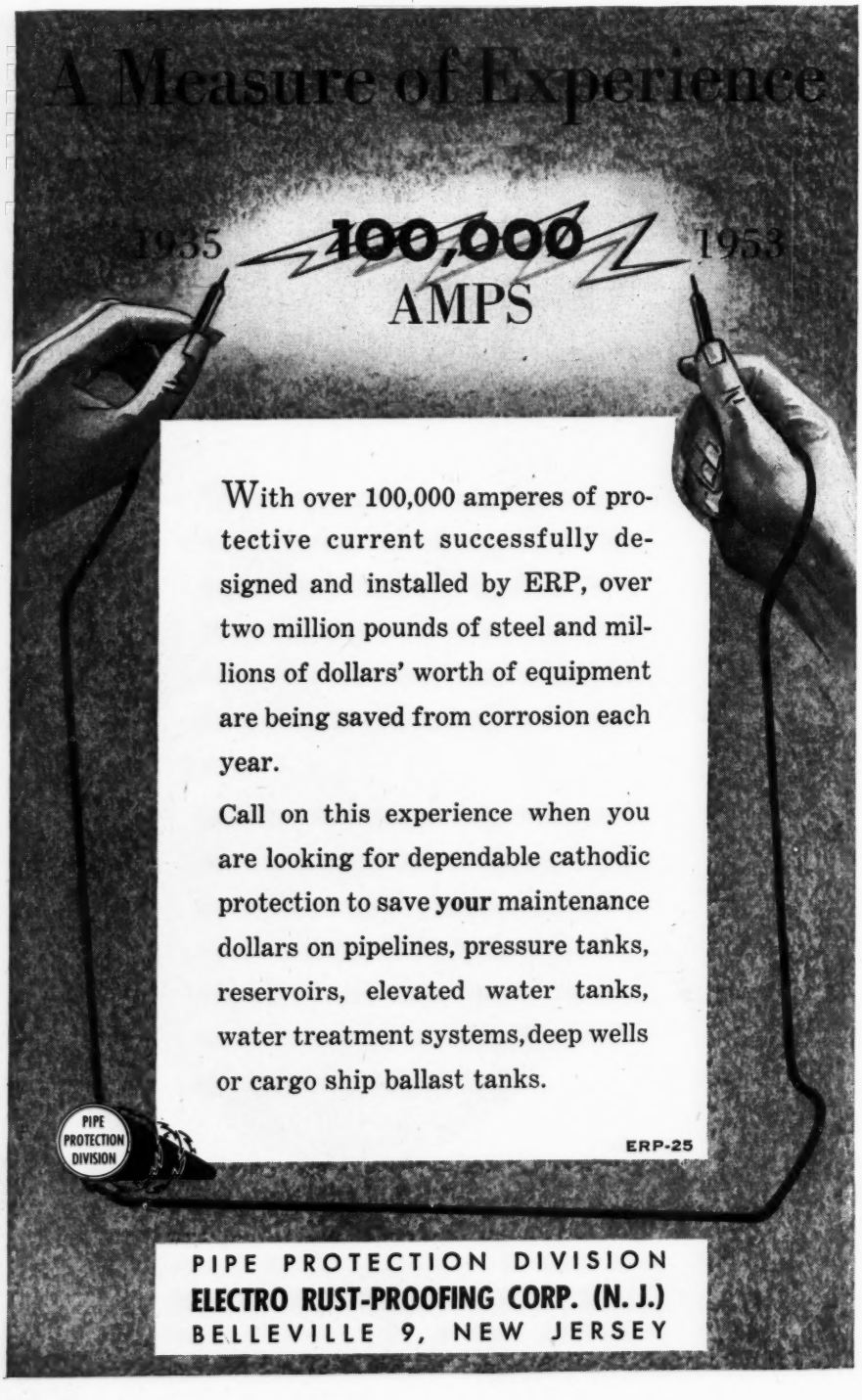
James R. Cowles
Oklahoma Natural

Fred Vallejo
Perrault

JAMES R. COWLES, for the past 14 years associated with the engineering department of Oklahoma Natural Gas Co., Tulsa, and lately heading up the cathodic protection program of the company, resigned his post June 15 to enter the consultation field as a cathodic protection engineer. In addition to handling corrosion and cathodic protection programs, he will instruct technical and engineering personnel of pipeline companies in the fundamentals of pipeline protection.

FRED VALLEJO, formerly with Bechtel Corp., San Francisco, has joined the sales division of Perrault Equipment Co., Tulsa. His territory will include west Texas, northern Oklahoma, Colorado, Nebraska, Kansas, and Missouri.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With over 100,000 amperes of protective current successfully designed and installed by ERP, over two million pounds of steel and millions of dollars' worth of equipment are being saved from corrosion each year.
Call on this experience when you are looking for dependable cathodic protection to save your maintenance dollars on pipelines, pressure tanks, reservoirs, elevated water tanks, water treatment systems, deep wells or cargo ship ballast tanks.
ERP-25
PIPE PROTECTION DIVISION
PIPE PROTECTION DIVISION
ELECTRO RUST-PROOFING CORP. (N. J.)
BELLEVILLE 9, NEW JERSEY

Progress Reports

PLANNED

CAROLINA NATURAL GAS CORP., Charlotte, N. C. Docket G-1956 for 40 miles of line to connect with Transco line near Kings Mountain, N. C., extending to Rock Hill, S. C., with laterals to four South Carolina points.

CENTRAL WEST UTILITY CO., Kansas City. Docket G-1682, four alternate plans to serve Clay county, Mo.

CHATTAHOOCHEE NATURAL GAS CO., Birmingham. Docket G-2066 for 70 miles of line in northwest Georgia, to connect with system of Southern Natural in Floyd county.

CITIES SERVICE GAS CO., Oklahoma City. Docket G-2149 for 69 miles of line—44 miles 20-in.; 25 miles 16-in.—and 1100-hp addition to Edmond compressor station in Oklahoma county.

COLORADO INTERSTATE GAS CO., Colorado Springs. Docket G-2120 (1953 program) 49 miles of 20-in. loop line on line near Denver; 30 miles of 12-in. to connect 20-in. with Morton county, Kan. compressor station; 24,860 hp compressor capacity at new and existing stations in Colorado, Oklahoma, Texas, and Kansas.

COLORADO INTERSTATE GAS CO., Colorado Springs. Docket G-2121 (1954 program) 365 miles of 22-in. line from Denver to connection with proposed Pacific Northwest Pipeline Corp. line at Green River, Wyo., with 5500-hp compressor station at Green River.

CONNECTICUT GAS CO., Berlin. Docket G-1954 for 3 short pipelines, totaling about 2 miles, to extend from Connecticut Light & Power gas plants to Algonquin Gas Transmission Co. from plants at Waterbury, Willimantic and Putnam, Conn.

EAST OHIO GAS CO., Cleveland. A 125-mile, 26-in. pipeline to serve Cleveland area from point just south of Toledo.

EL PASO NATURAL GAS CO. Docket G-2106 for total of 1792 miles of line to include about 750 miles of 30-in. and 70 miles of 24-in. mainline with related gathering lines, purification facilities and compressor plants totaling 161,860 hp to carry gas from Permian and San Juan basins.

EQUITABLE GAS CO., Pittsburgh. Docket G-2130 to activate the Logansport storage field in the Big Injun Sand, Marion county, W. Va., install a 1320-hp compressor station in Wetzel county, about 9 miles of 12-in. line from storage pool to compressor station, and various 6-in. and 8-in. well connecting lines.

FREDERICKSBURG NATURAL GAS CO., Fredericksburg, Va. Docket G-2041 for 28½ miles of 4¼-in. line and .72 mile of 3½-in. line connecting with Transco line, extending to Fredericksburg and area.

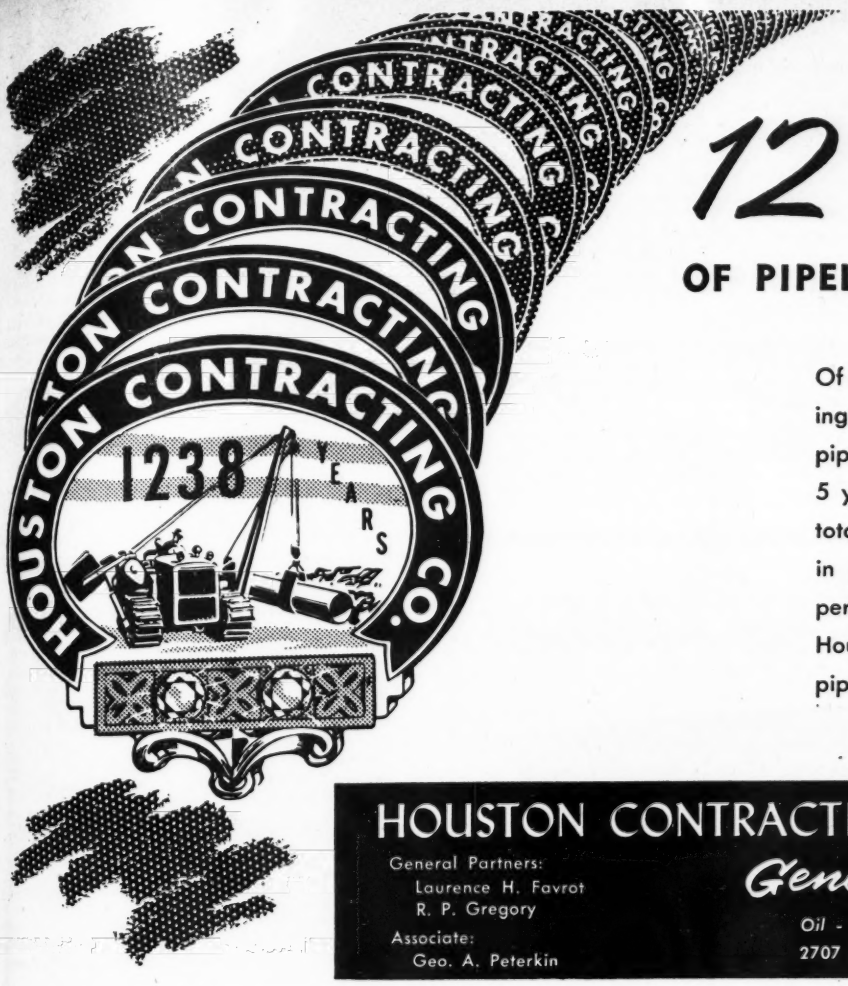
GLACIER GAS CO., Butte, Mont. Dockets G-1816, G-1817, G-1818 for 285 miles of 20-in. line from northeast of Kalispell, Mont. to Spokane, Wash.; 91 miles of 8⅝-in. from Spokane to Lewiston, Idaho; 120 miles of 16-in. from Spokane to Hanford, Wash.; 130 miles of 12¾-in. from Spokane to south of Trail, B. C.

HOPE NATURAL GAS CO., Clarksburg, W. Va. Docket G-2156 for 15.2 miles of gathering line, 3.73 miles of 12¾-in. transmission line, reconditioning of 46 wells, and redrilling of 15 to develop new Kennedy storage area in Lewis and Harrison counties, W. Va.

MISSOURI CENTRAL NATURAL GAS CO., Macon, Mo. Docket G-1509 for 25 miles of 6-in. from Moberly to Macon, Mo.

MISSOURI PUBLIC SERVICE CO., Warrensburg. Docket G-2057 for 109.3 miles of 8- and 10-in. mainline and 27.1 miles of lateral lines. System to connect with Panhandle Eastern Pipeline Co. line at Franklin, Mo. and extend northwest.

MORGANFIELD NATURAL GAS CO., Morgan-



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Of course, we haven't been building pipelines that long—but 146 pipeliners who have been with us 5 years or more have a combined total of 1238 years of experience in pipe line construction. This experience is an integral part of Houston Contracting's facilities for pipeline construction.

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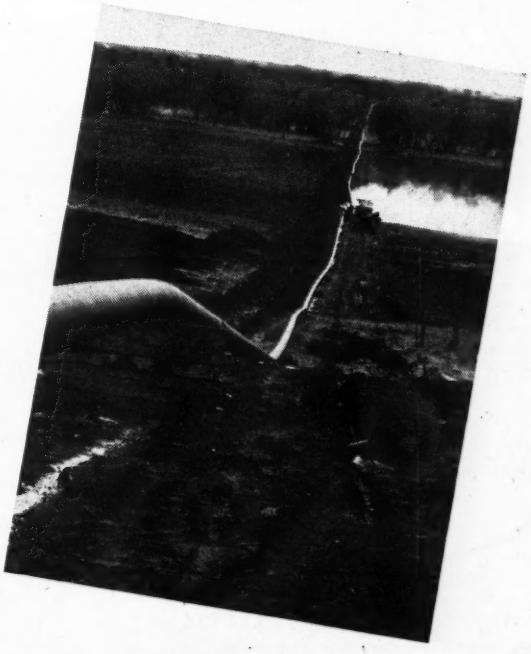

Make

Nicolet Regulator 15# Asbestos Pipe Line Felt.
Nicolet Perforated 15# Asbestos Pipe Line Felt.
Nicolet Medium Weight 8# Asbestos Pipe Line Felt.
Nicolet Vitrabestos, Glass Reinforced Asbestos Pipe Line Felt.
Other weight felts which are available because Nicolet is a custom manufacturer of Felt Products.

Nicolet Asbestos Pipe Line Felt has the minimum organic content and application strength is obtained without the use of organic reinforcements, such as hair.

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field, Ky. Docket G-1935 for a 31-mile, 4- and 6-in. line lateral to proposed Texas Gas Transmission Corp. line, to serve 6 Kentucky towns.

NEW YORK STATE ELECTRIC & GAS CORP., Ithaca. Docket G-1999 for total of 49 miles of pipeline; 25 miles 10-in. from DeRuyther to Norwich, N. Y., 24 miles 8-in. from Norwich to Oneonta, N. Y.

NEW YORK STATE NATURAL GAS CORP., Pittsburgh. Docket G-1980 (in part) for a 75-mile, 20-in. line from southern end of Driftwood field line to main dual line in Armstrong county, Pa. To be constructed in 1953.

NORTHERN NATURAL GAS CO., Omaha. Docket G-1918 for 400 miles of 24-in. pipe from the United States-Canadian border to a point near Minneapolis and two compressor stations with 5280 hp each.

NORTHERN NATURAL GAS CO., Omaha. Docket G-2009 for a 1.4-mile, 8⅝-in. branch line from its Omaha branch line to a proposed regulating station near La Platte in Sarpy county, Neb.

NORTHERN NATURAL GAS CO., Omaha. Docket G-2063 (in part-second year program) for 204 miles of 24-, 26- and 30-in. mainline additions to connect with Permian Basin Pipe Line Co. system, and 22,800 hp in new and existing stations in Texas, Oklahoma, Kansas, Nebraska, Iowa, Minnesota and South Dakota. Also 475 miles of branch lines and additions to serve customers in Iowa, Minnesota, Nebraska and South Dakota.

NORTHERN NATURAL GAS CO., Omaha. Docket G-2125 for 51 miles of line—including 36 miles of 30-in. mainline loop—in Texas, Oklahoma and Kansas.

NORTHWEST NATURAL GAS CO., New York. Docket G-996 for 992 miles of 18-, 20-, 22-, and 24-in. line in Washington, Idaho, Oregon and British Columbia, together with laterals and four compressor stations aggregating 30,800 hp.

PACIFIC GAS & ELECTRIC CO., San Francisco. Docket G-2102 to build about 259.7 miles of 34-in. mainline loops and 15,000 hp in compressor capacity on line from Topock, Ariz. to a point near Milpitas, Calif.; and 6.5 miles of line between Milpitas and Irvington, Calif.

PACIFIC NORTHWEST PIPELINE CORP., Houston. Docket G-1429 for 1466 miles mainline; 380 miles of spur and lateral lines; and 16 compressor stations totaling 104,420 hp, to extend from Ignacio, Colo., in the San Juan basin, to Bellingham, Wash. (Seattle area).

SHENANDOAH GAS CO., Lynchburg, Va. Docket G-1448 for 39 miles of line from a point near Middletown, Va. to points near Winchester, Va. and Martinsburg, W. Va.

SOUTHERN CALIFORNIA GAS CO. and **SOUTHERN COUNTIES GAS CO.,** Los Angeles. Docket G-2104 to build about 73 miles of 30-in. mainline loops and 5280 hp in additional compressor capacity at Blythe on existing line extending from Blythe to Santa Fe Springs, Calif.

TENNESSEE GAS TRANSMISSION CO., Houston. Docket G-1969 for certificate to perform natural gas transmission service for Niagara Gas Transmission Ltd., Toronto, and Iroquois Gas Corp., Buffalo. To construct 574-mile, 30-in. line from Kinder, La. to join existing system; 130 miles of loop line; a 45-mile spur from near Buffalo to international border; submerged crossing of the Niagara river; 17,520 hp additional at existing compressor stations; 3 new stations; and 158 miles of lateral lines.

TRANS-CANADA PIPE LINES LTD., for 2200-miles 30-in. line from Alberta to Toronto; 24-in. line from Toronto to Montreal with 14-in. line to Ottawa; 747-mile gathering system and 13 compressor stations totaling 94,160 hp.

TRANS-NORTHWEST GAS INC., Spokane. Docket G-2111 for construction of a 521-mile system to serve markets in eastern Washington and northern Idaho, starting at international border near Osoyoos, B. C., south to Hanford, Wash., east to Spokane and Wallace, Idaho, north again from Spokane area to Trail, B. C.

WESTCOAST TRANSMISSION CO. INC., Wilmington, Del., 396 miles, including 270 miles from Sumas, Wash. to Portland, Ore. with short branches to a number of cities in the two states, and 126 miles of laterals and 26 measuring stations. To connect witth 662-mile, 24-in. line to be built by parent company, Westcoast Transmission Co. Ltd., from Peace river area of Alberta and British Columbia. Location survey under way.

UNDER WAY

ALGONQUIN GAS TRANSMISSION CO., Boston. Facilities including several laterals remain to be completed. Work held up pending further FPC hearings.

CHICAGO DISTRICT PIPELINE CO., Joliet, Ill. Docket G-2090 for 3.4 miles of 36-in., 15.7 miles of 30-in. and a .2-mile river crossing of 24-in. pipe in the Chicago area.

CITIES SERVICE GAS CO., Oklahoma City. Docket G-2038 for installation of 11,400-hp compressor capacity—three 1600-hp units to be added to its Greenburg station, Kiowa county; six 1100-hp units in a new station in Harvey county, Kan. Expected to be complete Sept. 30, 1953.

EL PASO NATURAL GAS CO. Work in progress on plant construction for 153,000 hp in mainline and booster compressor stations.

LONE STAR GAS CO., Dallas. A 73-mile gathering and transmission system in Jack and Wise counties with a 3320-hp compressor station—the Jacksboro.

NEW YORK STATE NATURAL GAS CORP., Pittsburgh. Dockets G-1701 and G-1824. Williams-Austin Co. at work on 7.5 miles of 20-in. from Ithaca to Freeville Gate, N. Y. Harford Bros. working on 21.5 miles of 14-in. from Syracuse to Auburn, N. Y.

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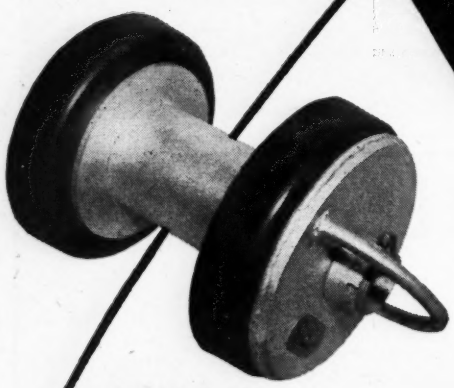

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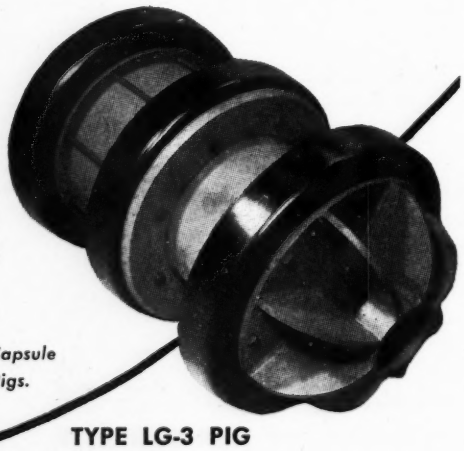

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Y. Williams-Austin Co. at work on 52 miles of 10-in. line from Fulton to Watertown, N. Y. Expect completion Aug. 1, 1953.

NORTHERN NATURAL GAS CO., Omaha. Docket G-1618 for 213 miles of 26-in. loop lines in Texas, Oklahoma, Iowa, Kansas, Nebraska and Minnesota, and 100,160-hp additional compressor capacity. Expect completion in October.

PACIFIC GAS & ELECTRIC CO., San Francisco. Docket G-1651 for 86.25 miles, 34-in. loop and 19,540 hp addition on existing Topock-Milpitas line. Engineers Limited Pipeline Co. at work on loop construction. Bechtel Corp. at work at Topock, Hinkley and Kettelman compressor stations.

PACIFIC GAS & ELECTRIC CO., San Francisco. Docket G-1892 for 15 miles of 20-in. pipe extending from Helm and joining the system's Topock-Milpitas line in Fresno county; and for 15.5 miles of 12¾-in. in Madera county parallel to the existing Madera-Livingston line, scheduled for construction in 1953-54.

PERMIAN BASIN PIPELINE CO., Omaha. Docket G-1928 for 234 miles of line and 54,880 hp in compressor stations to carry gas from Upton, Midland, and Pecos counties, Texas and Lea county, N. M. to connection with 24-in. El Paso Natural line to Dumas, Texas.

SOUTHERN CALIFORNIA GAS CO. and **SOUTHERN COUNTIES GAS CO.,** Los Angeles. Docket G-1718 for 13,520-hp additions to compressor facilities on existing line from California-Arizona boundary to Los Angeles. To be completed in September.

SOUTHERN NATURAL GAS CO., Birmingham. Docket G-1907. Total project approved including 792 miles of line and 14,200-hp compressor capacity—about 522 miles of looping on existing system with addition of 9800 hp to existing stations; about 270 miles in new lines and a new 4400-hp compressor station. Miscellaneous sized lines for gathering system, 384 miles to be laid south of Gwinville, Miss.; 5400-hp compressor at Gwinville; and 3300-hp compressor station at Estopinal, La. Brown & Root Inc., H. C. Price Co. and Houston Contracting Co. at work with completion expected in 1954.

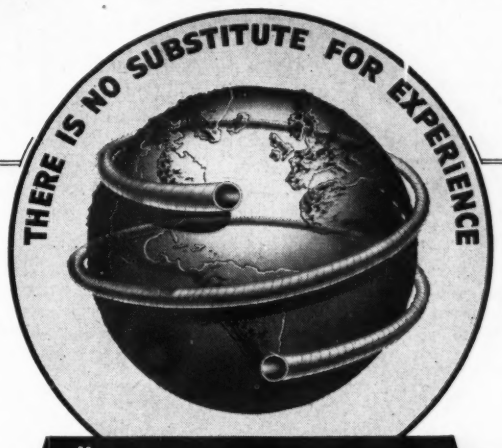
TENNESSEE GAS TRANSMISSION CO., Houston. To build 369 miles of line in 1953, enlarge two compressor stations and complete one new station. Of the total pipe, 173 miles will be 30-in. loop; 74 miles, 26-in. loop; and 132 miles of 24-in. line from Mercer, Pa. to Hebron storage field in Potter county, Pa. Addition of 2640 hp will be made at Carrollton, Ohio station; 2200 hp at Mercer, Pa., and a new 6600-hp station will be built at Kinder, La. H. C. Price Co. and Bechtel at work on Mercer-to-Hebron line, and Oklahoma Contracting, Anderson Bros. and Western Pipe Line Constructors at work on loop lines. Approximately 135 miles of loop has been completed.

TEXAS EASTERN TRANSMISSION CORP., Shreveport. Docket G-1947 for 315 miles of 24-in. line from a connection with Wilcox Trend line at Provident City, Texas to connection with existing system near Castor, La. Contractors at work: Associated Pipeline Contractors, 75 miles from Lavaca county to Waller county, Texas; Anderson Bros. Corp., 82 miles from Waller county to Polk county, Texas; Williams Brothers Co., 71.4 miles from Polk county to Shelby county, Texas; Pentzien Inc., four river crossings. Scheduled completion date is Aug. 1.

TEXAS GAS TRANSMISSION CORP., Owensboro. Docket G-1847 for 408 miles of 26-in. loop line in six sections. H. C. Price Co. has 31 miles remaining to be completed.

UTAH NATURAL GAS CO., Salt Lake City. To build a 62.8-mile 18-in. pipe from fields in Carbon, Emery and Sanpete counties running northwest to a point near Provo. R. H. Fulton & Co. is the contractor.

TEXAS ILLINOIS NATURAL GAS PIPELINE CO., Chicago. Docket G-1914 for six new compressor stations totaling 70,000 hp on its Texas to Illinois transmission line and installation of additional units totaling 10,000 hp at five existing stations. Also for construction of a suspension bridge across the Mississippi river and lateral



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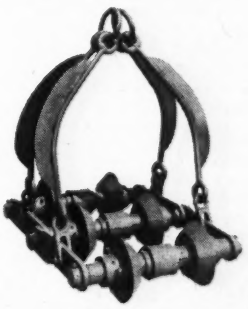

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lines to connect additional gas reserves to system. Contracts have been let for compressor work. Completion date, Dec. 1.

WESTERN SLOPE GAS CO., Denver. About 35 miles of line to complete system from Douglas Creek and Germesa fields to Grand Junction area. Expect completion Aug. 15, 1953.

WILCOX TREND GATHERING SYSTEM INC., Dallas. Docket G-1959 for one 2200-hp compressor station; 157 miles of line from McMullen county to connection with Texas Eastern near Provident City, Texas; and about 90 miles of laterals. H. B. Zachry Co. is trunkline contractor; Altgelt Construction Co. at work on gathering system; Brown & Root Inc. to build compressor station. Scheduled completion date Aug. 15.

PENDING CONSTRUCTION

ATLANTIC SEABOARD CORP. and **VIRGINIA GAS TRANSMISSION CORP.,** Charleston, W. Va. Docket G-2062 for two compressor stations totaling 10,560 hp.

EAST TENNESSEE NATURAL GAS CO., Knoxville. Docket G-1336 for a 100-mile, 16-in. line from near Knoxville to Kingsport, Tenn. with about 58 miles of various sized lateral lines.

HOME GAS CO., Pittsburgh. Docket G-2059 for 19-mile pipeline in Tioga and Broome counties, N. Y.

IOWA-ILLINOIS GAS & ELECTRIC CO., Davenport. Docket G-2012 for 22 miles of line to connect with Natural Gas Pipeline Co. of America's system in Mahaska county and extend to a point in Ottumwa county, Iowa.

NATURAL GAS CO. OF W. VA., Pittsburgh. Docket G-2059 for 21.3 miles of line and retirement of 14.7 miles in Columbiana county, Ohio.

NEW YORK STATE NATURAL GAS CORP., Pittsburgh. Williams-Austin Co. has contracted for 10.8 miles of 20-in. line from Craigs Corners to Caledonia, N. Y. pending FPC approval.

NORTHERN NATURAL GAS CO., Omaha. Docket G-2063 (in part—first year program) for 259 miles of 24- and 30-in. pipe and 50,400 hp in compressor capacity in new and existing stations in Texas, Oklahoma, Kansas, Nebraska and Iowa.

SOUTHEAST ALABAMA GAS DIST., Birmingham. A "U" shaped system of about 330 miles to serve 24 communities in southeastern Alabama from connections with Southern Natural.

SOUTH CAROLINA NATURAL GAS CO., Columbia, S. C. Docket G-1961 for a 160-mile pipeline in Aiken, Lexington, Richland, Orangeburg, Dorchester, Charleston and Berkeley counties, S. C.

UNITED FUEL GAS CO., Charleston. Docket G-2061 for 50.5 miles of 20- and 24-in. line from new 3300-hp compressor station at existing storage pool in Wood county to Lanham station in Putnam county, W. Va. Also acquisition of leaseholds and authority to drill wells, install well and field lines for new storage pool.

APPROVED

GULF INTERSTATE GAS CO., Houston. Docket G-2058 to construct 860 miles of 30-in. line from Point Rayne, La. to Boyd county, Ky., 229 miles lateral lines and five 8000-hp compressor stations in four states. Contracts let to H. C. Price and Houston Contracting Co. Work underway mid-June, expect completion Nov. 1.

CONTRACTS LET

MANUFACTURERS LIGHT & HEAT CO., Pittsburgh, Pa. has let contract to Dravo Corp. to install an 880-hp compressor station in West Bradford township, Chester county, Pa.

NEVADA NATURAL GAS PIPE LINE CO., Las Vegas. Docket G-1888 for 110 miles of 10-in. line from Topock, Ariz. to Whitney, Nev., serving Las Vegas and Henderson areas. Contract let to R. H. Fulton Co., Lubbock, Texas. Construction scheduled to start in September.